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Contractors and Engineers Monthly

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PICKS and SHOVELS

By O. E. POTTER

Back to Nature?

NO
PARKING
IN
PLANTING
AREA

Thus read some Arizona State Highway Department signs along the roadside on the Glendale highway north of Phoenix. Which reminded us once more of what has always seemed to us the incongruity of the Bureau of Public Roads belonging to the Department of Agriculture. But when our Editor reported, among many other things, these highway signs in Arizona, we decided that maybe it was quite all right.

We immediately had visions of all our state highway department engineers tenderly nurturing little rock gardens or private vegetable plots along the highways. It seemed as if there must be some special significance in the thought of these busy, efficient he-men engineers taking the time to get back to nature.

But the rosy visions turned out to be just a little cock-eyed. It seems that all this was merely part of the Arizona State Highway Department's well-planned attempt to improve and beautify the roadsides and it would all have been quite clear if they had just said "Planted" in the first place.

They really are doing some very effective planting of palms and shrubs along the Arizona highways as rapidly as funds are available under WPA projects. The shoulders are 8 feet wide and the plants are placed outside this area and staggered informally about 10 feet apart. In sections where irrigation ditches run alongside the shoulders, and this happens much too frequently for the happiness of the highway engineers, because the effect of the water is to swell the soil and thus damage the paving, water direct from these ditches is used for irrigating these shrubs.

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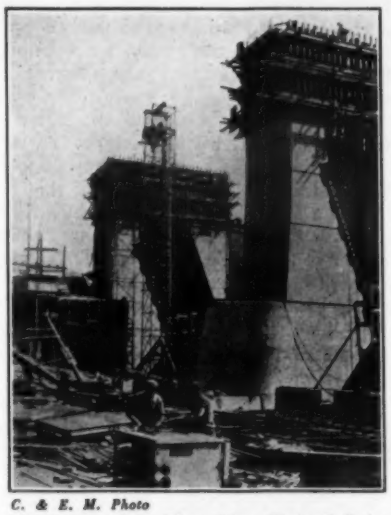


C. & E. M. Photo

The Pumpcrete Pipe Line Extended to Pour the Walls of the Operating Building

Road-Mix Aggregate Shown Up by Tests

Laboratory Tests of Mixes Show That Loss of Color, Even If There Is No Swell, Indicates Probable Failure

By J. W. POWERS,
Engineer of Materials,
Arizona State Highway Department

IN JUNE, 1930, the Materials Division of the Arizona State Highway Department published in the Department magazine, *Arizona Highways*, a method for determining the suitability of an aggregate to be mixed with oil. At that time the only idea was to secure dust elimination and a low-cost road, so that almost any combination of materials was acceptable. The use and service of road-mix surfaces has now been so generally accepted that the original ideas of merely securing a low-cost road and dust elimination have been lost in the desire to create an inexpensive surfacing that will serve on highways the same as any other pavement.

With this increasing use of road-mix and the demand for service placed upon it, the selection of materials to mix with the oil becomes of primary importance. The procedure for testing mineral aggregate as required by the present specifications of the Arizona State Highway Department are as follows:

"*Test of Mineral Aggregate:* All mineral aggregate for either road or plant oil-mixed course shall successfully meet the following test:

"The material as graded for the project shall be mixed with the proper percentage of oil, conforming to asphaltic road oil as specified herein [SC-2] and the portion passing the 10-mesh sieve shall be screened out for test. The material passing the 10-mesh sieve shall then be tamped into a steel mold approximately 3 inches in diame-

(Continued on page 22)

Pumping Concrete To Complete Dam 16 On Miss. River

(Photo on page 40)

IN October, 1935, CONTRACTORS AND ENGINEERS MONTHLY described the start of cofferdam construction and unwatering for the completion of the great lock and dam across the Mississippi River at Muscatine, Iowa, by the Central Engineering Co., of Davenport, Iowa. In the months since that article appeared a massive structure, fully equipped with Tainter gates to control the flows of the great Father of Waters, has arisen from the depths of the cofferdam. The pouring of the dam and spillway required 60,000 cubic yards of concrete, of which 45,000 yards for the dam and operating houses was centrally mixed in a plant mounted on the cofferdam and carried to the forms by a huge concrete pump.

The stationary plant was erected soon after the excavation within the cofferdam started so that it was ready for the pouring of the concrete at once. A 502 Koehring crane with a 1¼-yard Blaw-Knox clamshell unloaded the gravel and sand from barges tied outside the outer line of steel sheet piling. Inside the inner line of sheet piling separate bins were created for stockpiling by driving extra lines of the sheet piling at right angles to the walls. A "bucket chaser" was used on the barge being unloaded, and the crane man, batching man on the Blaw-Knox plant and one man handling the Fuller-Kinyon portable cement pump on the cement barge made up the crew serving the plant.

Central Engineering Co. Rush Huge Structure at Muscatine; Wellpoints Keep Work in the Dry

Beneath the weighing batchers was a hopper from which the batched aggregates and cement could be diverted to either of the two 1-yard Chain Belt Rex mixers in which the concrete was mixed for 1½ minutes. One mixer operator handled the two units. The cement was stored in a 175-barrel capacity steel silo with a conical bottom in which a worm was located which moved the cement up a slight incline to the weighing batcher. The batchers for the aggregates and cement were equipped with Howe dial scales and the water batcher was a small tank mounted on a Fairbanks platform scale.

Pumping the Concrete

Both mixers delivered the mixed concrete through separate chutes to the agitating hopper of the Rex Pumpcrete, a double 8-inch unit. With one man on the hopper and another on the Pumpcrete itself the contractor was able to deliver a maximum of 60 batches per hour to the forms, with an average of between 46 and 47 batches, at distances equivalent to 1,200 feet of pipe line, or an actual linear distance of 600 feet and with a maximum lift of 70 feet to the top of the operating houses.

When the concrete was being deliv-

(Continued on page 27)

THE GREAT SAN FRANCISCO-OAKLAND BAY BRIDGE

At 12:30 P. M. Thursday, November 12, 1936, This New $77,200,000 Bridge Was Opened for Traffic, Giving San Francisco a Continuous Artery to the East. She Now Awaits the Opening of the Golden Gate Bridge to Furnish the Artery to the North. C. H. Purcell Is Chief Engineer of the San Francisco-Oakland Bay Bridge.

Mexican Experiences Of Highway Engineer

By ROBERT B. BROOKS, JR.,
Civil Engineer, St. Louis, Mo.

(Photos on page 40)

Work on Inter-American Highway Provided Many Interesting and Amusing Incidents

MEXICO is currently thought of, here in the States, as being a hot and dusty desert, sparsely decorated with cactus, sage brush, chapparal and adobe huts, and as a matter of fact some parts of Northern Mexico do correspond to this popular idea. But Mexico, as a whole, is decidedly kaleidoscopic. Almost every form that nature can take may be found in central Mexico: snow-capped mountains of volcanic origin, colorful rocky canyons, torrential mountain streams and waterfalls, luxurious forest growth, dense and impenetrable jungle, desert, fertile fields and sandy beaches may all be found within a ten-hour ride from the capital city.

Mexico City is a cosmopolitan metropolis of a million population, beautiful buildings, parks, monuments, and feverish taxicab drivers comparable in every respect with those of New York. Seven thousand feet above sea level and in the tropics, Mexico City has a year-round temperature similar to Chicago's temperature in March or October.

On one overcast December day I asked a porter if he thought it would rain. He replied unhesitatingly, "No, sir." Rather amused at his positive answer, I asked why. He replied, "Because it doesn't rain in December." And sure enough, it didn't! The rainy season begins in May and ends in October, during which time you can almost count on a nice refreshing rain every afternoon.

The winter months are the months of sport and entertainment in Mexico City. Bull fighters and Jai Alai players of world-wide reputation may be seen in the capital during these months.

I entered the service of the Mexican Government on November 1, 1934, when their road program was intensified with the object of completing the highway from Mexico City to Laredo, Texas.

My first couple of assignments took me north over the highway to Ixmiquilpan and Jacala where asphalt pavement was being laid.

Folk of North Mexico Primitive

The Otomi Indians of these mountain districts have not intermarried very much with the Spanish. The Otomi language is still spoken and many elderly people can neither speak nor understand Spanish. They are rather silent and surly. The laborers in this section carry long daggers in their sashes and the engineers carried guns while working with these men.

Many natives in this outlying district wear the same kind of white cotton pants and shirts and leather sandals that their ancestors wore before the advent of Cortez. The nights are cool in the mountains and the natives throw coarsely woven blankets or "zarapes" around themselves. The women wear white blouses and black cotton skirts and carry their babies with the aid of a shawl or "reboza" in true Indian fashion either "piggyback" or straddling the mother's side, or slung in the reboza, the child's weight being supported from the mother's shoulders.

The language of these people is simple, containing about 200 words. The Otomi word "Totsi" for example, means "please pass me the soup." In Spanish one must say, "Hagame el favor de darme la sopa." Many's the time I've seen and heard a man order his wife to come to him, or bring him something by uttering a single gutteral grunt, and by a lazy wave of the hand order her away. Several of my friends have asked for the translation of these orders, but being a married man myself, I know of no English equivalents.

The natives of this Sierra Madre mountain range are probably the most independent people with which the government has to deal. They are slow to acquiesce under orders and seemed to mistrust my associates and myself. None of the adult Otomi Indians were very chummy with any of the engineers. However, we did manage to learn a little of the language from some children of an old woman who cooked for us. With toys and candy we spoiled them terribly and taught them to swear vehemently.

One incident should not be passed without note. There is a narrow street leading into Ixmiquilpan from Mexico City, which has a high wall of adobe brick on both sides. One day while riding down this street in a large bus I saw a man and his wife, both heavily laden, scramble off the road and flatten themselves against the wall, and as the bus drew nearer the woman shied like a horse, and rooted in behind her husband,

(Continued on page 14)

The Author Inspecting the First Wood Sheet Piling Driven for the Third Pier Cofferdam of the Tampaon Bridge

C. & E. M. Photo

Docking a "Battleship"

N. Y. Sewer Tunnel Nears Completion

Sequel to Last Month's Story Tells of Tunnel Running West on Sewer Contract in the Bronx

DRILLING toward the setting sun and through a solid ledge of Fordham gneiss, the rock crews of Rodgers & Hagerty tried to get as far away as possible from the "sand hogs" who also started at Brook Avenue and Southern Boulevard, Bronx Borough, New York City, and began burrowing eastward, and whose work was described in the November issue of CONTRACTORS AND ENGINEERS MONTHLY.

Driving the Shaft

The Bronx Intercepting Sewer in this section is horseshoe shaped 10 feet high and 8 feet wide with a 9-inch concrete wall. The shaft, measuring about 18 x 75 feet, was driven at the east side of Brook Avenue in Southern Boulevard to a depth of 41 feet, the first 31 feet being in dirt and the remainder in rock. All shots in rock were covered with steel mats which were also hung over the portal of the tunnel during early blasting in the tunnel.

Attacking the Rock

Rodgers & Hagerty have a very effective 4-drill carriage which runs on the 40-pound railway tracks laid at grade. When drilling, a 4-inch pipe post is jacked to the top and bottom of the tunnel to permit speedy setting of the drills and to steady the carriage against the vibration and drive of the four Ingersoll-Rand drills. Drillers and helpers on each shift drilled one round of 36 to 38 holes, using 6 to 8-foot steel of 1¼-inch diameter. The shift worked eight hours and it was usually possible to make one shot on every shift. This gave an average progress of 20 feet of rock tunnel per day with the best progress being 24 feet. Instead of using a steel runner, all of the drill steel was sent out on a Koppel "battleship" skip during mucking and sharpened with an I-R drill-steel sharpener in the shop located at one end of the compressor house.

Using 40 and 60 per cent du Pont dynamite, the face was blown clear and was readily cleaned up in two to three hours with a Conway No. 50A mucker loading to the "battleships" on Koppel flat cars and hauled by two Whitcomb electrically-driven locomotives. Each locomotive handled four cars and, by use of a stub switch in the tunnel and a run-around at the shaft, 2-train traffic was handled without any inconvenience. The mucking machine was pulled all the way out to the shaft to clear the tracks when drilling was in progress.

(Continued on page 12)

Applying the Primer and Waterproofing Agent

Defective Pavement Effectively Repaired

Methods of Construction and Cost of Resurfacing Damaged Concrete Road in Wisconsin

By M. P. BROKAW,
Junior Assistant Engineer, State Highway Commission of Wisconsin

DURING the recent construction of 7.56 miles of 20-foot portland cement concrete pavement in southwestern Wisconsin, a very unusual condition was remedied with the use of material not usually associated with pavement construction.

Approximately three weeks after the completion of the paving operations on one section of this project, an extensive deterioration of the surface, ranging from slight spalling to complete disintegration of portions of 270 linear feet of pavement, was discovered. A thorough investigation was made to determine the cause.

Initial curing was by wet burlap for the first 24 hours, and it was found that this particular section of pavement was protected with burlap that had not been properly washed before its use. Organic matter was present in the burlap fibers and was liberated upon the semi-plastic concrete during the intermittent periods of watering.

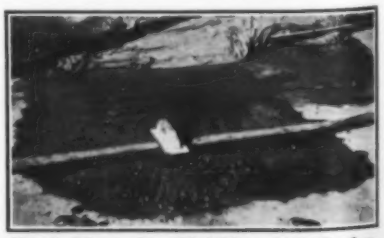
To replace the slab completely over such an extensive area would have been a very expensive procedure and would have delayed the opening of the road for two weeks, so it was decided to remove the defective surface to a depth of 2 inches and replace it with concrete designed for the use of Embeco nonshrink aggregate manufactured by the Master Builders Co., Cleveland, Ohio.

Method of Work

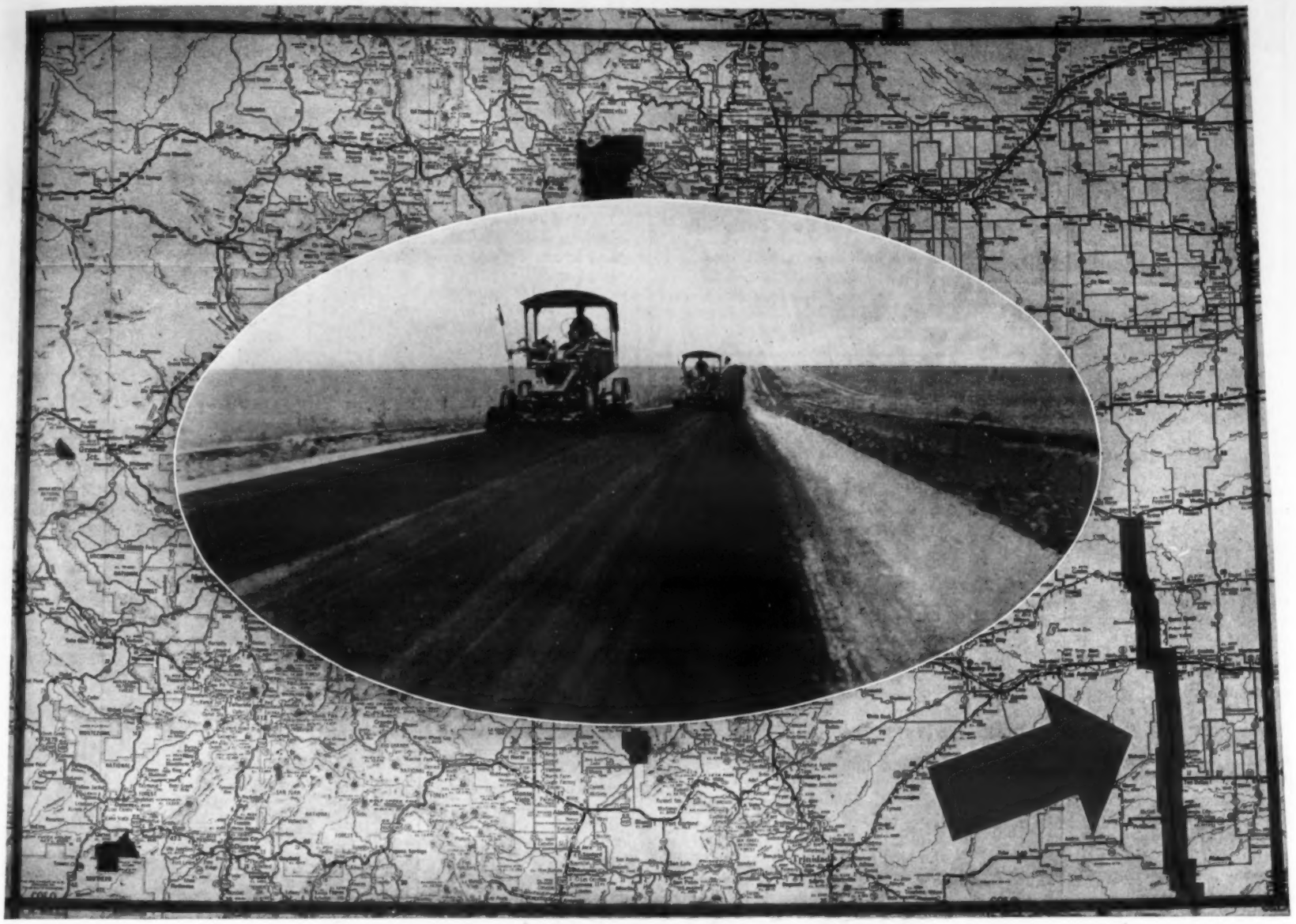
Twenty-four sections, varying from 1 to 36 square feet in area and totaling 201 square feet, were selected for removal. An Ingersoll-Rand compressor and pavement breaker with 29 Timken drills were used, requiring 25 compressor hours to complete the job. Holes were drilled at 5-inch centers and broken through with a spade tool. All edges were finished with the aid of hand tools.

A mortar consisting of one part Embeco and one part portland cement was

(Continued on page 15)



Hand Float for Finishing and Burlap Cover for Curing



MIXING MINERAL AGGREGATE AND TEXACO ASPHALT SURFACING MATERIAL IN CONSTRUCTION OF ROAD-MIX TYPE SURFACE ON 126-MILE SECTION OF COLORADO STATE HIGHWAY NO. 59

126-MILE COLORADO HIGHWAY RECEIVES ASPHALT ROAD-MIX SURFACE

From Kit Carson, Colo., State Highway No. 59 stretches south for 126 miles to the Oklahoma line—almost half way across the State from south to north.

On this important and sizable link in its State Highway System, Colorado has just completed a TEXACO Asphalt surface, Road-Mix type. Simple to construct, economical both in first cost and maintenance, TEXACO Road-Mix surfacing is smooth, resilient and durable.

The ideal type of surface for this 126-mile link in Colorado State Highway No. 59, TEXACO Road-Mix construction may also fit perfectly into your own road or street program. Our nearest office will furnish complete information.

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The Spirit of Rudolph Diesel

In death he lives, this greatest contributor to the creation of power in the modern world. Almost as dramatic as his death during the World War aboard one of the many craft that disappeared without trace has been the rise of the modern diesel engine first given to the world by Rudolph Diesel in 1896. Huge power plants using the economical thermodynamic principles of this internal combustion engine powered by a cheap liquid fuel became increasingly common but the initial cost of the engine and its great weight per horsepower inhibited its use in construction equipment until a scant five years ago.

On December 2 at the Waldorf-Astoria in New York City many engineers and a few editors gathered to honor the fortieth anniversary of the production of the first commercial diesel engine. From occasional units of large horsepower produced on order, the scene has changed to the modern production line where diesel engines roll off as completed units, ready for the orders which are not long in coming.

In May, 1930, CONTRACTORS AND ENGINEERS MONTHLY discussed editorially the future of the diesel engine in the construction industry and its applicability to the rough service of construction equipment. The recent years of industrial inactivity were fruitfully devoted to research by several of the progressive engine manufacturers of this country with the result that we now have mass production of diesel engines for such varied types of construction equipment as tractors, shovels, cranes, trench excavators and heavy-duty trucks. We are proud of our prophecy which has come true in such a short time. Even those few years ago, when the number of manufacturers of the full diesel was small, we were severely criticized for even harboring the thought that the diesel could become a major contender for preeminence as a power unit for heavy construction equipment. Now, with its ignition-fired mate, the semi-diesel, using the same fuels, it is making such headway that a number of manufacturers of the gasoline engine has turned to the production of diesel or semi-diesel prime movers.

The tremendous enthusiasm of the manufacturer leads him to envision the day when the fuel oil engine will completely dominate the power field. We personally hope that such a day will never come. The great saving effected today by the diesel cycle is the use of a low-grade cheap fuel. The fundamental economic law of supply and demand will inevitably eliminate that saving. When the diesel millenium arrives, there would be all diesel and no gasoline engines, with a tremendous demand for fuel oil and little demand for gasoline, resulting in high prices for fuel oil.

Let us rather look forward to an even greater development and use of the diesel engine in the vast field where it can serve most effectively, and along with it the gasoline engine in its field of service.

All honor to the memory of Rudolph Diesel. He built truly better than he knew and, with the genius of the modern machine shop, has given us the most economical engine of today.

Roadside Development Instead of Just Beautification

Long-range practical benefits, rather than immediate aesthetic values, should guide the landscape architect today in his program of roadside development. It was obvious at the Departmental Meeting of the Highway Research Board in Washington last month that it is now "thumbs down" on the term "Beautification." The highway engineer's banner is now emblazoned with the broader, more fundamental slogan "Roadside Development."

No one condemns beauty, but more generous backing can be secured now and in the future from interested civic organizations and engineers if other than purely aesthetic features of roadside development are given first attention. The ill-considered memorial planting of trees that produce "lacy foliage" in the spring and wither and die the next summer can do much to damage the program of roadside development, because it merely inflates temporarily the ego of the local Ladies Garden Club or a Legion Post and its failure creates antagonism to all such programs.

Well-planned planting must be practical, and should return to *natural* growths the barren slopes created by cuts and fills. Judicious cooperation between the designing and construction engineer and the landscape architect will produce less steep, more natural slopes that will more readily support the growths of grasses, vines and low shrubs at no more cost than the steeper, well-manicured bare slopes of today that wash out in every rain and are the bane of the life of the maintenance men.

The vast construction programs for eliminating reverse curves and sharp turns leaves many lozenge-shaped plots, from a few thousand square feet to acres in extent, that offer opportunities for the practice of the arts of the landscape architect in the production of beauty spots and picnic grounds, with plenty of rubbish cans to entice the banana skins and waxed paper from their places of rest on the ground.

Some of the more enthusiastic landscape architects have urged the planting of trees to line the approaches to traffic circles and other intersections. Here we must part from the ideals of beautification and consider safety factors first. The points where traffic must cross, or even rotate about the same circle in the same direction, offer too many opportunities for accidents. Sight distance is the best protection, so keep the trees away from the intersections.

Let us have roadside development with the fundamental concepts of safety and beauty properly evaluated.

U. S. Bureau of Roads Reports on Year's Work

The highway work administered by the U.S. Bureau of Public Roads during the fiscal year ending June 30, 1936, exceeded that of any previous year in point of projects approved, contracts awarded, and work placed under construction. Contracts were awarded for 22,300 miles at a cost of $489,000,000 of which $393,000,000 was to be supplied by the Federal government. Work placed under construction in that time totaled 21,800 miles at a total cost of of $454,000,000. The 17,300 miles of road completed were built at a total cost of $280,000,000.

During the fiscal year, 300 railroad grade crossings were eliminated, 10 elimination structures were reconstructed and protective devices were installed at 185 crossings. At the end of the year 1,240 eliminations were under contract, most of them under construction, and 168 elimination structures were under contract for reconstruction.

The combined highway and grade crossing work furnished direct employment of 1,673,935 man-months to an average of 139,500 men. The indirect employment in production and transportation of materials brought the average full-time employment to 362,000 men. Assuming that each worker supports two other persons, highway work administered by the Bureau supported more than one million people.

Highways are now being designed for the safe accommodation of vehicles moving at speeds of 60 miles per hour, according to Bureau officials. This applies both on new highways and in the further improvement of the large mileage of highways being improved by successive stages. Important among the changes required are improvements of curvature, both horizontal and vertical, that will permit of a longer view ahead necessitated by the new high speeds. In most cases this is done by local corrections of the alignment of the existing road. In some instances, especially where the present roads are crowded closely by property development, it is necessary to select entirely new locations for the trunk lines.

Other badly needed improvements that it has been possible to supply in the current program include a general widening of road surfaces; the complete separation of lanes for opposing traffic where density of movement requires more than two lanes; the elimination of the more dangerous railroad crossings, the provision of bypass routes around cities and the improvement of routes of direct access to the centers of cities.

International Congress Of Testing Materials Assn.

The Second International Congress of the International Association for Testing Materials will be held in London, April 19-24, 1937. The object of the Congresses held by this association is to obtain international cooperation in the study of materials and their testing, and to provide facilities for the exchange of views, experience and knowledge with regard to all matters connected with this subject. The London Congress should be of considerable interest and importance, particularly in view of the length of time which has elapsed since the First Congress held in Zurich in 1931.

Leading authorities in their respective fields in the principal countries throughout the world have been invited to present papers, and about 150 papers have already been promised.

Further information on the Congress may be secured from the Honorary Secretary of the Congress, Mr. K. Headlam-Morley, International Association for Testing Materials, 28, Victoria Street, London, S.W.1, or through the American Society for Testing Materials, 260 South Broad St., Philadelphia, Pa.

Courtesy, Rockefeller Center Weekly

"Would You Mind Pulling Down Your Shade So We Can Get On With Our Building?"

States Had Nearly a Billion For Highway Uses in 1935

State highway departments received $902,010,000 for highway purposes in 1935, according to the reports of state highway officials to the Bureau of Public Roads. Allocations from payments by highway users in registration fees, gasoline taxes, motor-carrier taxes and tolls on state-operated bridges and ferries produced $589,818,000 or 98 per cent of the income from state revenue sources.

Federal funds received by the states amounted to $219,381,000 while $20,366,000 was derived from counties and other local sources, $55,883,000 came from the sale of bonds and notes, and $16,562,000 was appropriated from general funds or derived from miscellaneous sources.

State highway department expenditures amounted to $848,355,000, of which $416,412,000 was for construction and $184,458,000 was for maintenance. Other expenditures for equipment, administration, state police and interest on highway debt brought the total expenditure for state-administered highways to $713,066,000. Retirements of bonds amounted to $55,756,000 and $79,533,000 was transferred for use on local and park roads or was used for non-highway purposes.

The income for highway purposes and total expenditure for those purposes of each of the states are given in the table below:

INCOME AND EXPENDITURES FOR HIGHWAY PURPOSES BY STATES

State	Total Income (1,000 Dollars)	Total Expenditures (1,000 Dollars)
Alabama	$ 13,856	$ 12,197
Arizona	5,499	5,631
Arkansas	15,161	16,102
California	39,934	37,802
Colorado	8,600	7,781
Connecticut	24,093	16,898
Delaware	3,101	3,613
Florida	11,145	11,548
Georgia	16,545	16,479
Idaho	5,669	6,105
Illinois	37,693	42,729
Indiana	18,969	17,953
Iowa	21,593	22,239
Kansas	18,953	17,949
Kentucky	17,647	18,806
Louisiana	21,550	19,022
Maine	12,109	11,671
Maryland	16,007	14,700
Massachusetts	39,268	36,719
Michigan	26,591	23,653
Minnesota	25,073	22,950
Mississippi	9,824	9,976
Missouri	25,875	27,661
Montana	8,300	7,633
Nebraska	9,975	10,379
Nevada	4,666	4,587
New Hampshire	6,530	6,165
New Jersey	25,473	26,771
New Mexico	7,301	7,359
New York	57,187	54,770
North Carolina	31,151	28,083
North Dakota	4,969	4,911
Ohio	29,135	25,772
Oklahoma	12,279	11,568
Oregon	17,774	16,991
Pennsylvania	63,465	45,972
Rhode Island	6,174	3,681
South Carolina	11,388	12,597
South Dakota	6,999	6,728
Tennessee	16,889	14,190
Texas	36,129	33,905
Utah	6,111	5,914
Vermont	6,336	5,920
Virginia	22,471	19,790
Washington	18,816	17,666
West Virginia	19,572	20,406
Wisconsin	32,677	31,335
Wyoming	5,468	5,078
Total	$902,010	$848,355

An 80,000-Yard Cut With Steep Haul

(Photos on page 40)

ON FAP 128-B, a 4.854-mile grading, drainage and retread paving project awarded to Ralph Rogers Co., of Bloomington, Ind., there were several large earth and rock cuts that taxed the power of both loading and hauling equipment. On this contract east of Bloomington on Indiana State Route 46, two large cuts stand out, one of 40,000 yards about 400 feet long with 12 feet of overburden and with a maximum depth of 40 feet and a second with 80,000 yards of excavation and a maximum haul of 1,200 feet, the average haul being about 600 feet.

Rock Drilling Equipment

An Ingersoll-Rand wagon drill put down maximum 18-foot holes with 2½-inch I-R detachable bits reduced to 2 inches at the bottom of the hole as the contractor used 12-inch sticks of 2-inch Atlas 40 per cent Extra dynamite for blasting. The shots were fired with electric blasting caps and an Atlas blasting machine. Most of the holes ran between 12 and 14 feet deep. Air for the wagon drill was supplied by an I-R double-stage air-cooled compressor of 365 feet capacity mounted with a Caterpillar D-11,000 diesel engine and air tank on heavy channels with I-beam cross braces and the entire unit carried on a steel sled. The compressor was located at the bottom of the hill in which the second of the two cuts was made and the 100-pound air delivered through a 2½-inch line over the hill. It was easier to deliver the fuel to the compressor alongside the road at the bottom of the hill and pipe the air over the hill than to haul the fuel up the hill twice a day.

Loading Earth and Rock

In order to handle the large rock with maximum speed and not have to pick up and toss all the large pieces, the contractor had his Koehring 701 shovel, powered with a Caterpillar D-13,000 diesel engine, equipped with a 1¾-yard bucket with a 2-yard opening so that most of the rock would drop through. It made the bucket look slightly shallow but it did the trick.

A fleet of six 5-yard Dumptors did all the hauling. The standard question on the job is "Which way does a Dumptor run, frontward or backward?" Our answer, being a true Yankee, was "Does a paver run backward or forward?" and there the matter rested. These hauling units were put to as hard a test as one could fairly ask any piece of equipment to meet. When the cut was first opened and for some two weeks thereafter, the Dumptors were required to carry their full loads down a 24 per cent grade to the fill.

The shovel loaded 1,500 yards in a 14-hour day when the material was mixed earth and rock. Its production on rock alone was about 1,000 yards and on earth alone 2,000 yards. The rock was placed in maximum 4-foot lifts in the fill and the earth in 9-inch layers spread by a Caterpillar Fifty diesel tractor with a Euclid bulldozer. Each lift was rolled with a Huber 10-ton gas roller.

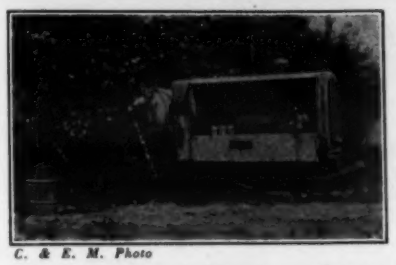
This particular balance was completed in 60 days, working two 7-hour shifts five days a week and using a short shift on Saturday to finish out the 40 hours per man or to make up lost time by extending the Saturday working time.

On all rock cuts the rock was taken down 8 inches below subgrade as a minimum. The rock on this contract broke from 12 to 24 inches low.

Ralph Rogers Company Hauled Excavation Down 24 Per Cent Grade on Indiana Grading Job

Drainage

There were several large box culverts on this job, with all the work being handled by a subcontractor. In addition to two 3 x 2-foot box culverts 174 and 268 feet long there was a considerable footage of 30, 36, 48, and 54-inch Armco paved invert culverts replacing box culverts because they were less expensive to install. There was about 300 feet of the paved invert culvert and 1,300 feet of 12 to 24-inch corrugated metal culvert in addition.



C. & E. M. Photo

The Diesel-Powered Compressor Mounted on Steel Skids

Prior to installation the entire road was cored to determine the best locations for the pipe culverts to eliminate free water from the subgrade.

Quantities

Excavation, common	92,773	cubic yards
Excavation, solid rock	88,049	cubic yards
Excavation, special borrow	7,611	cubic yards
Overhaul, one balance	2,822	cubic yards
Concrete, structures, Class D, 1:2:3	1,462.6	cubic yards
Reinforcing steel	191,042	pounds

Personnel

This FAP 128-B, consisting of 4.854 miles of grading, drainage and retread surface, was awarded to Ralph Rogers Co. of Bloomington, Ind., for $214,649.03. The work was in direct charge of Harry L. Barry, one of the partners in the company. For the State Highway Commission of Indiana the work was in charge of E. A. Smith, Project Engineer.

Penn-Dixie Personnel

Pennsylvania-Dixie Cement Corp., New York City, has announced the appointment of Herbert M. Cross as District Sales Manager in metropolitan and suburban New York, New Jersey and Connecticut with headquarters in the Lincoln Building, 60 E. 42nd St., New York City. Mr. Cross, who has been acting as District Manager in the Philadelphia District, is succeeded there by Joseph G. McCabe, Jr., formerly Assistant District Manager. Ira F. Honaman, who has been a salesman in the Philadelphia district since June, 1929, has been promoted to Assistant District Manager in Philadelphia.

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3/8 YARD CAPACITY AND LARGER

One of Koehring's New Long-Range Draglines

New Series of Draglines For Long-Range Operation

Especially designed for large drainage projects, extensive stripping operations, wide channel and channel change excavation and levee building and enlargement, the two new Koehring Long-Range dragline Models 702 and 802, recently announced by Koehring Co., 3026 West Concordia Ave., Milwaukee, Wis., have a wide range of operating flexibility, with faster than ordinary speeds, ample power and tough digging ability, according to the manufacturer.

Features of these new machines are the substantial extra-high A frame, for boom rigidity and balance; long and extra wide crawlers for stability and low ground pressure; heavy-duty motor for power in tough digging; swiveling boom point fairlead with large sheaves and drum barrels for increased cable life, and Koehring heavy-duty construction throughout.

Model 702 handles 1¼ to 2¾-yard buckets on booms varying from 70 to 50 feet in length, while Model 802 handles 1½ to 3-cubic yard buckets on booms from 70 to 55 feet in length. The former may be powered with a 165-hp Wisconsin gasoline engine or a 144-hp Caterpillar diesel or a Buda 165-hp diesel while Model 802 is powered with a 200-hp Wisconsin gasoline engine or a 185-hp diesel. The overall height of both models is 21 feet 5 inches, the overall length of the crawlers 16 feet 9 inches, the overall width of the crawlers is 11 feet 7 inches on the 702 and 12 feet 1 inch on Model 802, and the minimum radius of operation is 20 feet for both machines.

Complete details on these new draglines are contained in a new bulletin entitled "Koehring Long-Range Draglines" which may be secured direct from the manufacturer by mentioning this magazine.

Easton Appoints New Agent

The Easton Car & Construction Co., of Easton, Pa., has announced the appointment of the H. B. Fuller Equipment Co. as its agents in the Cleveland territory. The Fuller Company will handle the complete Easton line, including quarry equipment, dump bodies for motor trucks in rock work, industrial electric or gas-electric trucks, bitumen heaters, industrial cars, Easton-Lakewood lift truck bodies and trailers, industrial turntables, and lift truck snow plows.

H. B. Fuller and G. S. Crego, principals of the Fuller Company, have long been identified with the quarry and construction industry in northern Ohio. The addition of the Easton products completes an extensive line of equipment handled by that company.

A Versatile Sinker For Soft and Hard Rock

The H-11 sinker made by the Cleveland Rock Drill Co., 3734 E. 78th St., Cleveland, Ohio, has been out long enough to show where it stands in the 55-pound air drill class. Primarily designed as a hard rock machine it has shown itself capable of working in soft and medium formations as well. It has a fast, powerful hammer blow, strong rotation and effective hole-blowing.

Some of the features of this machine are: its fast, positive, automatic valve; the oil reservoir surrounding the front spacer, capable of supplying ample oil to all moving parts for at least four hours; positive lubrication of the rifle nut; the lubricating system which distributes oil to all parts of the machine, even to the front end; a chrome-plated spacer claimed to wear three times as long as ordinary spacers, thus avoiding piston and side rod breakage; a four-pawl rotation mechanism; a large and well-designed exhaust port which does not freeze; a floating type clutch permitting slight misalignment without binding the piston; and shielded side rods which prevent cramping between the cylinder and chuck housing.

Increased Loading Space on Dodge Trucks

Increased loading space and reduced overall length giving greater ease of handling in traffic and maneuvering for loading are features of the new cab-over-engine conversion just announced by the Truck Sales Division of the Dodge Division, Chrysler Corp., Detroit, Mich. The Montpelier de luxe cab-over-engine conversion can be had on Dodge LF series 1½-ton chassis in all standard wheelbases and can also be supplied on special wheelbases from 108 inches up. The 129½-inch wheelbase unit, for instance, offers a back-of-cab-to-rear-axle dimension of approximately 81 inches, which is recommended to accommodate a 12-foot body.

The cab has a streamlined front with the roof and cab corners fully rounded. The cab sides extend straight down below the sill to the running board line. The top of the cab is arranged with double textured fabric deck material. The front end of the chassis is of heavy-duty construction to take care of the redistribution of load in the chassis. A heavy-duty steering gear with 18 to 1 ratio is supplied.

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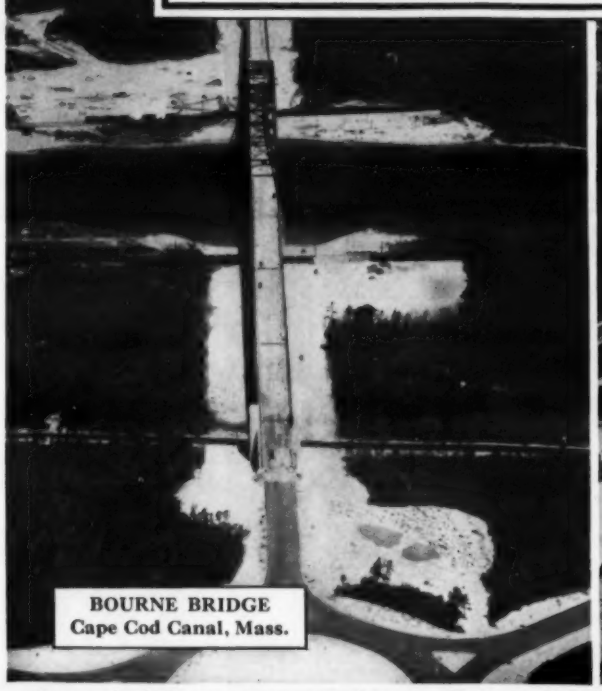
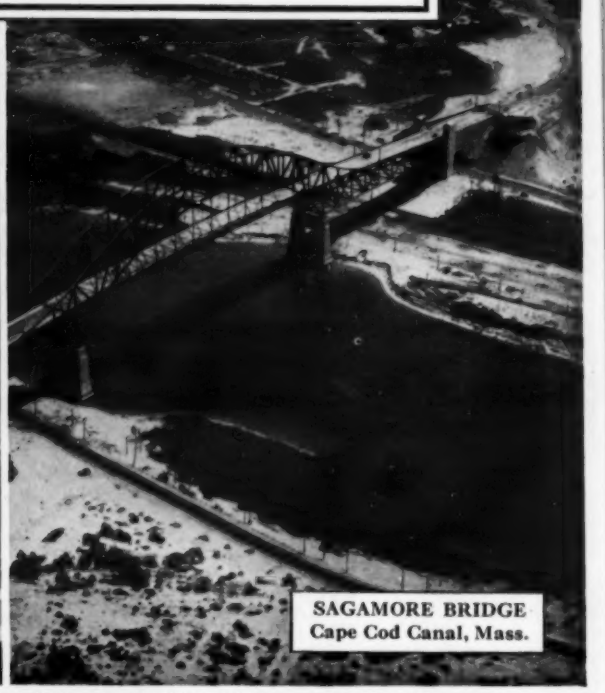




Socony Asphalt over a mop coat of Socony Waterproofing Asphalt, Standard Brand, Bourne Bridge (left), Sagamore Bridge (right), Cape Cod Canal, Mass. Photos by 101st Photo Sect., 26th Div. Aviation, Mass., N. G.

Socony Asphalt Road Oils · Socony Asphalt Joint Fillers · Socony Waterproofing Asphalt · Socony Cut-Back Surfacing Asphalt · Socony Asphalt Binder A for surface treatment · Socony Refined Asphalt for sheet asphalt paving · Socony Cold Patch Asphalt for all types of patching · Socony Asphalt Binders B & C for penetration work (Asphalt Macadam) · Socony Paving Asphalt 51-60 and 61-70 Penetration for the mixing method (Asphaltic Concrete) · Socony Asphalt Emulsion for Surface Treatment, Penetration, Road and Plant Mix, and Patching · *Specifications and all other particulars furnished on request.*

STANDARD BRAND SOCONY ASPHALTS AND ROAD OILS

SOCONY-VACUUM OIL CO.
INCORPORATED
STANDARD OIL OF NEW YORK DIVISION

High-Speed Diesels In Shovel Sales

From almost every corner of the United States, on both private and government work, come reports of new ¾ and 1-yard shovels powered with high-speed diesel engines. From the Cummins Engine Co., Columbus, Ind., comes an interesting picture of the distribution of its diesels powering shovels and cranes.

Bay City recently shipped a ¾-yard shovel, powered with a 6-cylinder 85-hp Cummins diesel, to the Forest Service at Tucumcari, N. M. Two similar units went to private contractors in Colorado. Five additional ¾-yard units were shipped for the Department of Agriculture to various points over the country. Browning Crane reports the sale of a ½-yard unit with a 4-cylinder Cummins diesel to a contractor in Mexico, shipped through New Orleans. Buckeye Ditcher has recently finished four ⅝-yard cranes equipped with 4-cylinder Cummins diesels.

General Excavator Co. reports the largest group of ¾-yard deliveries, with thirty going to private contractors, the Forest Service, Department of the Interior, and Department of Agriculture in thirteen states. All thirty units are alike and equipped with 6-cylinder Model H Cummins engines. Lima recently delivered a 1-yard shovel equipped with a 6-cylinder Cummins to the Forest Service and four identical engines were shipped to California to replace the engines originally installed in four Lima shovels of the same service. The Osgood Co. shipped to California six 1-yard shovels, all of which were equipped with Cummins H-6 diesels, for the U. S. Engineer Corps and the Department of the Interior. Byers recently delivered two ¾-yard shovels, one to the Forest Service and the other to the Department of Agriculture. Both were powered with Cummins H-6 engines. This same company delivered to a Buffalo contractor a ½-yard shovel with a 6-cylinder Cummins.

The flexibility of the high-speed type of diesel engine, as built by Cummins, is made immediately available by the 24-volt electric starting systems used on these engines. For ½ to 1-yard shovels, manufacturers are using the H type of Cummins engine which develops 85-90 hp at 1,200 rpm in the 6-cylinder unit and approximately 55 hp at 1,200 rpm in the 4-cylinder model.

State Highway Workers Take First Aid Course

Approximately 2,000 employees of the Minnesota Highway Department, stationed throughout the state, have recently completed first aid courses which were arranged by Highway Commissioner N. W. Elsberg, in cooperation with the American Red Cross. Those who passed the final examinations were given certificates showing that they had successfully completed the regular Red Cross course of instruction.

Because highway employees are continually on the roads and often are the first at the scene of traffic accidents, Mr. Elsberg believes that they should be in a position to give first aid in such emergencies. Red Cross physicians state that in numerous cases accident victims are seriously injured by well-meaning but untrained persons who handle them before a doctor can reach the scene.

Dow Opens Chicago Office

The Dow Chemical Co., Midland, Mich., manufacturer of calcium chloride, has announced the opening of a Chicago Branch Office, located in the Field Building, 135 South La Salle Street, Chicago.

Surface Stabilization for Secondary Roads

There are approximately 2,300,000 miles of unimproved secondary roads in this country, representing 80 per cent of the total road mileage of the United States. In recent years there has been an increasing demand for the development of a low-cost road construction program that would include the improvement of these secondary roads.

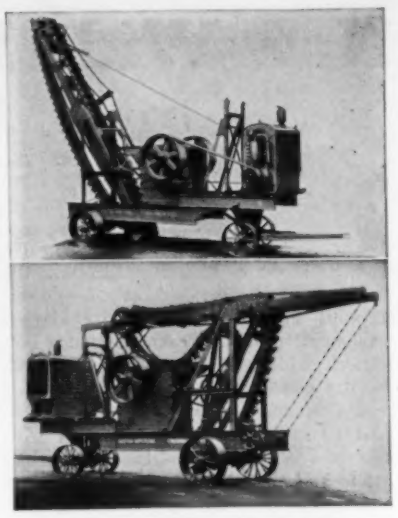
The success attending the stabilized calcium chloride gravel roads completed during the past few years has definitely shown the practicability of roads of this type on our secondary road systems. The Fifth Edition of "Road Surface Stabilization" issued by the Solvay Technical and Engineering Service, Solvay Sales Corp., 40 Rector St., New York City, contains the complete information necessary for the construction and maintenance of stabilized road surfaces, using calcium chloride. The information in this Bulletin has been revised in accordance with latest developments in stabilization practice and the results of studies of stabilized road surfaces which withstood the attacks of the severe winter of 1935-36 and flood conditions the following spring.

Portable Crushing Plant

A new line of small portable crushing plants for contractors and state and county highway departments has just been announced by the Austin-Western Road Machinery Co., Dept. Y, Aurora, Ill.

Each unit of this line, which is known as the C.E.P., consists of a crusher, a folding elevator, and a Waukesha motor of suitable horsepower, all mounted on a steel-tired truck for easy transportation. The crushers in this line consist of eight sizes, with jaw openings of 9x16, 9x20, 15x20, 4x40, 9x40, 18x38 and a roll crusher for crushing accurately sized stone with 30-inch rolls, having a diameter of 18 inches.

Complete information on these C.E.P. crushers may be secured direct from the manufacturer by mentioning this magazine.



Two Views of the New Austin-Western Portable Crusher

ABOVE RIGHT: *Concrete grout for columns flowing into the Pumpcrete hopper via a wooden chute from the mixer . . .* ABOVE: *The Pumpcrete pipe line running north about eighty feet and then up a forty-five degree angle for a forty-foot run into a floor hopper. To the left of the main pipe line can be seen the auxiliary pipe line for pouring the western side of the north and south walls and piers.*

● Construction difficulties were plenty on this south portion of Chicago's $10,000,000.00 Outer Drive improvement. The economical pouring of concrete was the hardest problem to solve. Old-time methods for pouring concrete would have cost a fortune.

How the Pumpcrete Proves Its Flexibility

The Pumpcrete placed at the central mixing plant ended the need for numerous costly runs, towers and chutes. The Pumpcrete pipe line carries the concrete to any desired location; in one case the line runs east, north, west and then south for two hundred feet to pour directly into the wall and column forms.

Auxiliary pipe lines are connected as desired, up to a thousand feet, to pour piers, walls, sloping buttresses and decks, varying in height from three to fifty feet. There's no system for pouring concrete so flexible as that.

Averages Over 27 Yards Per Hour

In a day's run of sixteen hours, this single Pumpcrete pumped 28½ cubic yards of concrete per hour. On several 8-hour-day runs it averaged 27 to 30 yards per hour, with a one-minute mix.

Write us for a descriptive booklet of the Pumpcrete.

CONCRETE by PIPELINE with REX PUMPCRETE

CHAIN BELT COMPANY
1666 W. Bruce Street, Milwaukee, Wis.

New Wide Pavement On U. S. 91 in Utah

(Photo on page 40)

ROUTE U. S. 91, the major north and south highway through the state of Utah, carries heavy industrial as well as tourist traffic. Its 18-foot pavement south of Provo created a bottleneck which has now been overcome by the construction of 2.985 miles of widening and new pavement. The 18-foot pavement has been widened with two 10-foot concrete strips to finished grade and the old pavement which was widened by a 1-foot strip on either side was covered with rock asphalt for about 1.08 mile while the new location consists of two 20-foot concrete slabs.

The Grading Operations

The new grade was put in last year under another contract so the contractor had only to come in on this project and rough in the new gravel to an approximation of the finished grade with a Caterpillar patrol grader having an 8-foot blade. Crushed and screened gravel for the base was hauled from the contractor's pit about 3 miles from the center of the job, spread and rolled with a 12-ton steam roller. The maximum size stone in the base gravel was specified as 1 inch.

As soon as the gravel base was brought to grade the form crew, consisting of nine men and a foreman, set the Metaform and Blaw-Knox forms to line. Immediately behind them came the grade planer pulled by a Caterpillar Fifteen tractor. This planer consists of two 3 x 10-inch timbers spaced 20 inches apart with 2 x 6-inch diagonals and ½-inch tie rods. On the front of the planer are adjustable sections of old grader blades which are set to cut the thickened edge of 2 inches in the outer 2 feet. The planer runs on metal shoes on the adjacent slab or on the forms and has a 4-inch adjustment through a threaded belt with double nuts to set it at the desired elevation by tightening on both sides of the inverted angle iron attached to the frame of the planer. A pair of 8-foot levers lift the entire planer clear of the forms on a foot plate 12 inches square mounted on a 2-inch shaft. A spring catch holds the plate clear of the grade when the levers are raised so that the planer may be pulled along the ground to cut it to grade.

The fine grade crew consisted of ten men and a foreman hand shoveling to or from the grade after the planer had been used. The base was rolled with a new Galion single roll machine with the compression roll filled with water to give the equivalent compression of a 10-ton roller. The machine with its 42-inch roll is powered with a Hercules engine and turns in a very short radius because of the short wheel length and the sharp cutting in of the pair of steering wheels.

Gravel Plant and Batching

A complete Cedar Rapids screening, crushing and washing plant was installed by the contractor in an excellent pit near the job. From this pit he took not only the base gravel but also the crushed gravel aggregate for the concrete. The plant was fed by a Caterpillar RD-7 and LeTourneau bulldozer which pushed the material onto a 4 x 4-inch grizzly. The plant had a double-deck vibrating screen speeding up the production of the plant tremendously so that it was able to handle 75 to 100 tons of material per hour. The plant was driven through a belt from a 6-cylinder Climax Blue-Streak engine.

From the crushing and screening plant the material was run over a belt conveyor to the Cedar Rapids washing plant run by a Ford Model-A engine. Water for the washing was at first supplied by a pump from a nearby stream but as soon as the operation was well under way a mountain stream was tapped and sufficient water secured from Slate Canyon to care for all the washing. The gravel plant was run two 6½-hour shifts daily. All the gravel for the subbase was weighed on Fairbanks platform scales as payment was made on a tonnage basis.

Strong and Grant Ran Own Gravel Plant and CompletedConcreteRoad With Much Hand Labor

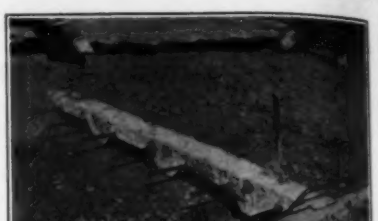
The washed sand and gravel was hauled from the plant to stockpiles adjacent to the batching plant about 600 feet away. Through the barricades the materials were fed to belt conveyors leading to the three wooden bins over the batchers. Each of the conveyors were powered with an old automobile engine. Adjacent to the batching bins was one for the subbase gravel so that it would not be necessary to run the gravel plant at all times to supply that material. Trucks were loaded direct from the bin.

The batches as weighed out on the Blaw-Knox batchers with Howe scales consisted of: 1,489 pounds of sand, 862 pounds of ¾-inch gravel, 1,280 pounds of coarse gravel, and the 7 bags of cement added at the paver. The weights were determined twice daily by the Plant Inspector after screen analyses.

Pouring and Finishing the Slab

The weighed batches without cement were hauled out from the plant adjacent to the gravel pit by a fleet of International and Ford trucks, hauling from two to four batches. The cement was hauled out on a flat bed truck and stacked in 7-bag piles along the adjacent slab where it was handy for the four men who cut and emptied the sacks into the skip of the MultiFoote 27E paver. One extra man piled and tied the empty sacks. Just ahead of the paver one man oiled and cleaned the top of the forms and painted the edge of the adjacent slab on the widening section with asphalt. The final clean-

(Continued on page 33)



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Timber Bridges Solve Problem

Dubois County, Ind., Tackled Rebuilding of 3,500 Structures on Small Revenue, Creosoted Timber Used Throughout

By CARL J. HEIM
Dubois County Surveyor and Road Supervisor

AT a special session of the Indiana State Legislature in 1932, all of the township-maintained roads were removed from the jurisdiction of the township trustees and placed in the county highway systems. In the southern part of the state this resulted in a considerable larger undertaking than was originally anticipated, due to the fact that in many counties the unimproved township road mileage was larger than the improved county highway system.

In Dubois County, which is a typical example of many of the southern counties, there were 3 miles of unimproved roads for each mile of improved roads after the change. In the 755 miles which made up the new highway system there were approximately 3,500 drainage structures. The maintenance of these structures and the construction of new structures to replace failed ones proved to be one of the problems in proportioning the revenue available for highway use, which amounted to approximately $85,000.00 annually.

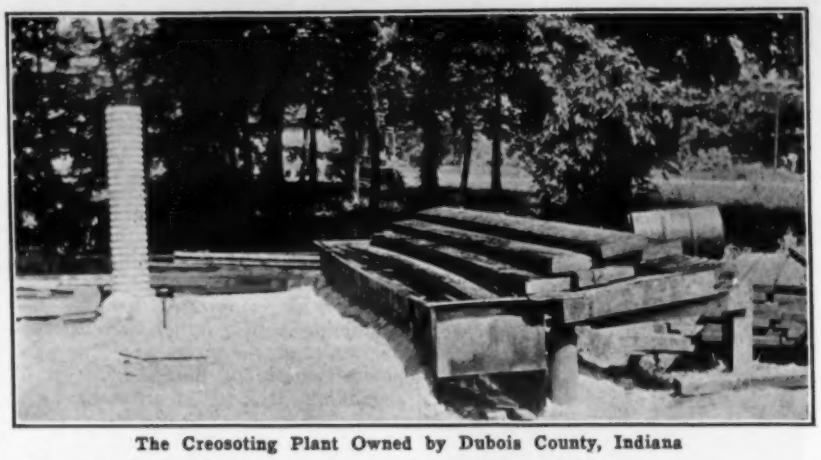
After making out a tentative budget it was apparent that it would be impossible to build permanent type structures and it was decided to build timber structures wherever the drainage area required something larger than could be taken care of with corrugated pipe.

The advantages of timber construction were that they could be constructed rapidly; they could be taken down and moved or their roadway increased if they did not fit in with the future surfacing of the unimproved roads; the entire expenditures could be kept in the county to help the farmers and the local unemployment situation if native oak timber was used; and, most important of all, their immediate cost would be about one-third of the cost of permanent construction.

Creosote Treatment

In investigating several timber bridges to arrive at the useful life which could be expected from them, records of two bridges which had been constructed by a township road supervisor were found. These bridges were approximately 50 feet in span and made up of three spans each. Both of these bridges were constructed of native oak lumber and one of them had been given a treatment of coal tar creosote applied with a brush. The life of this bridge which had been given a light treatment of creosote was approximately double that of the untreated structure. Records kept and published by several railroad companies show that pressure-treated railroad ties will last from two to four times longer than untreated ties.

For these reasons it was decided to give the bridge timbers a dip treatment, using a tank filled with hot creosote. The tank, with a capacity of about 150 gallons of creosote, was so arranged that a fire could be kept under it to heat the creosote and the cover for the tank could be used as a drain rack for the treated timber. This treatment gave the timbers a light skin coating and filled the cracks and checks, thereby preventing decay and destruction by termites.



The Creosoting Plant Owned by Dubois County, Indiana

Approximately 200,000 board feet of treated native oak timber was used during the past two years in the construction of approximately sixty bridges and the reflooring of numerous light, steel truss spans. All timbers were framed before treating and only seasoned timbers were used.

The table on page 15 shows the itemized and total costs of several typical structures. The average cost of the timber used, including the cost of the creosote treatment, was $35.00 per

(Continued on page 15)

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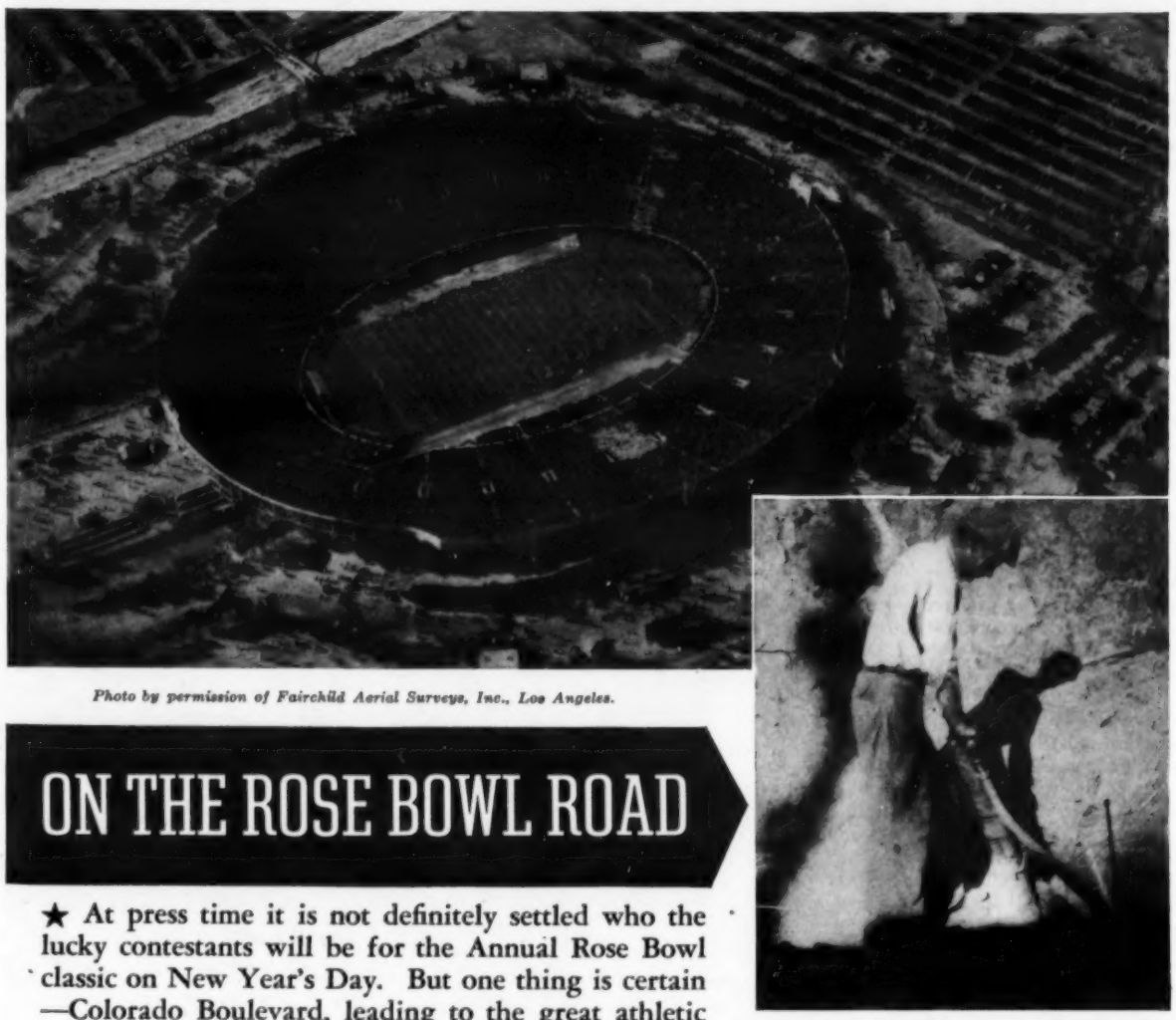

Photo by permission of Fairchild Aerial Surveys, Inc., Los Angeles.

ON THE ROSE BOWL ROAD

★ At press time it is not definitely settled who the lucky contestants will be for the Annual Rose Bowl classic on New Year's Day. But one thing is certain —Colorado Boulevard, leading to the great athletic field in the foothills near Pasadena, will be ready for the usual surging streams of traffic. For Cleveland Rock Drills and Paving Breakers were put on the job to insure that the highways leading to the Rose Bowl would be ready in time. The contractor made certain everything would be in readiness when he selected the right tools for the job.

Whenever you have a rush job, one that requires absolutely dependable and thoroughly efficient rock drilling or paving breaking equipment, put Cleveland machines on the work. Fast, dependable, and economical, Cleveland's are your one best bet. Bulletin 110 on request.

A Cleveland Paving Breaker operating in the underpass below Colorado Boulevard, and immediately adjoining Colorado Bridge. The thoroughfare leads to the Rose Bowl, and must be completed in time for the New Year's Game. The answer—Cleveland Rock Drills and Paving Breakers.

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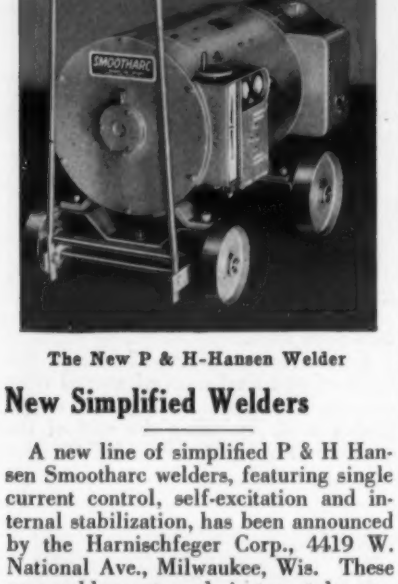

The New P & H-Hansen Welder

New Simplified Welders

A new line of simplified P & H Hansen Smootharc welders, featuring single current control, self-excitation and internal stabilization, has been announced by the Harnischfeger Corp., 4419 W. National Ave., Milwaukee, Wis. These new welders are made in two styles vertically mounted in 75, 100 and 150-ampere capacities and horizontally mounted in 200, 300, 400 and 600-ampere sizes. Both models are uniformly and compactly built, and streamlined to eliminate projecting parts and to permit easy portability.

The single current control feature of these welders is made possible by means of a simple micrometer screw shifting device on the generator brushes automatically maintaining the voltage at a high value. A simple turn of one controlling dial quickly gives the desired welding current.

All Smootharc welders are self-excited by means of auxiliary brushes placed ahead of the main brushes and connected to an auxiliary shunt winding. By means of the special generator design, the shifting of both main and auxiliary brushes is accomplished and the proper amount of excitation is always available for each current setting.

Self-stabilization is secured through the use of interpole winding extended to the main pole shoes so that it serves the dual function of interpole winding and stabilizing winding. This assures less spatter loss because speedy arc recovery is secured through the combination of short circuit winding and the magnetic bridge located in the main field magnetic circuit.

Other mechanical improvements on these new welders include the generator instruments mounted in a single control panel built into the side of the streamlined motor housing; the use of all rolled steel and arc-welded construction; and all steel parts annealed to give the highest possible quality magnetic field for generator fluxes.

A New Spray Gun

The new Saylor-Beall spray gun, recently announced by the Saylor-Beall Mfg. Co., 1501 E. Philadelphia Ave., Detroit, Mich., consists of a small gas-powered air compressor, a spray gun combining both internal and external nozzles, and the necessary hose and nozzle connections, designed for use in repainting traffic stripes, signs and other jobs involved in the maintenance of highways and equipment.

Low-pressure internal atomizing is considered the most economical system for applying most liquids because such nozzles give the greatest coverage per cubic foot of air used. However, some materials, like fast drying lacquers, must be atomized after they leave the gun. The Saylor-Beall gun is designed to be changed quickly to handle either type of material and therefore provides an all-purpose spray.

The New Saylor-Beall Spray Painting Gun

The Saylor-Beall Mfg. Co. also makes a line of air compressors and accessories, including low-cost outfits especially designed for general maintenance service for state and county highway departments and for contractors!

Highway Mileages In the Philippines

The Department of Public Works and Communications of the Philippine Islands which has supervision over the Bureau of Public Works reports the following road mileages by types as of December 31, 1935: unimproved earth and non-surfaced, 1,566.16 miles; improved earth, sand-clay, gravel, etc., 6,183.19 miles; waterbound macadam, 1,361.61 miles; macadam, surface-treated and penetration, 858.36 miles; cement concrete, 45.18 miles.

There is no mileage for bituminous concrete and asphalt paving, block-stone, wood block, asphalt block or brick.

A district board, responsible for the upkeep of roads in the part of India known as Bombay Presidency, was recently obliged by the subordinate judge to award the equivalent of over $1,000 for damage suffered by a truck on a bad road. —*World in Brief.*

PERFECT BALANCE....
means EASY Dumping

LANSING K-4 CONCRETE CART

Pneumatic-tired wheels, Timken Roller bearings. Dumps easy, speedy. Capacity 6 cu. ft. dry material. A profit-maker for contractors, builders and concrete workers. Round bottom bowl is 38¼" long at top and 19½" deep. Weight about 200 lbs. Write for costs and data.

LANSING COMPANY
LANSING, MICHIGAN
Chicago New York Philadelphia Kansas City San Francisco Boston Minneapolis

● The men who operate these machines know the greater efficiency and extra savings of hydraulic power.

Costly gears, pinions, and universals have been abandoned for faster direct acting hydraulic controls that maintain their efficiency regardless of their years of service.

Lost motion cannot develop. Extreme heat or cold cannot limit their speed or their power.

Every industry has adopted hydraulic power when precision and safety must be combined with speed and long life.

It is only natural, therefore, that Austin-Western should continue its 60 years' leadership by adopting and perfecting this control for road building and earth moving equipment.

Write for details of the A-W system as it applies to any one of the machines shown or listed here.

The Austin-Western Road Machinery Co.
Home Office: Aurora, Illinois Cable Address: AWCO, Aurora, Ill.
Branches and Warehouses in Principal Cities

ROAD GRADERS
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ROAD-MIX MACHINES
CULVERTS
BITUMINOUS DISTRIBUTORS
CRUSHING AND WASHING PLANTS
SWEEPERS AND SPRINKLERS
SHOVELS
CRANES, ETC.
SNOW PLOWS

Exhibitors at ARBA Annual Convention

Space for the Highway Exhibit to be held in connection with the annual convention of the American Road Builders' Association in New Orleans, January 11-15 has already been oversubscribed, according to a recent report from Charles M. Upham, Engineer-Director of the Association and Secretary of the Allocations Committee.

Exhibitors to whom space has been allotted for the 1937 Highway Exhibit include the following:

J. D. Adams Co.; Air Reduction Sales Co.; Allis-Chalmers Mfg. Co.; The American City Magazine; American Concrete Expansion Joint Co.; American Manganese Steel Co.; Anthony Co.; Armco Culvert Manufacturers Assn.; The Asphalt Institute; Athey Truss Wheel Co.; Austin-Western Road Machinery Co.; Barber-Greene Co.; The Barrett Co.; Bendix Products Corp.; Bendix-Westinghouse Automotive Air Brake Co.; Black & Decker Mfg. Co.; Blaw-Knox Co.; Bucyrus-Erie Co.; Buda Co.

C. H. & E. Mfg. Co.; Calcium Chloride Assn.; Caterpillar Tractor Co.; Chain Belt Co.; Chevrolet Motor Co.; Cleaver-Brooks Co.; Cleveland Tractor Co.; Concrete Surfacing Machinery Co.; Construction Machinery Co.; Continental Motors Corp.; CONTRACTORS AND ENGINEERS MONTHLY; D-A Lubricant Co.; Deere & Co.; Dow Chemical Co.; Eaton Mfg. Co.; Edison-Splitdorf Corp.; E. D. Etnyre & Co.; Euclid Road Machinery Co.; Evans Products Co.; Fairbanks, Morse & Co.; Foote Co.; Four Wheel Drive Auto Co.; Fuller Mfg. Co.

Galion Allsteel Body Co.; Galion Iron Works & Mfg. Co.; General Motors Truck Co.; W. S. Godwin Co.; Gorman Rupp Co.; Gruendler Crusher & Pulverizer Co.; Harnischfeger Corp.; Heil Co.; Heltzel Steel Form & Iron Co.; Hercules Motors Corp.; Hetherington & Berner, Inc.; Highway Steel Products Co.; Frank G. Hough Co.; Hug Co.; Insley Mfg. Co.; International Harvester Co.; Iowa Mfg. Co.; Jaeger Machine Co.; C. S. Johnson Co.; Johns-Manville Corp.; Keystone Driller Co.; Kinney Mfg. Co.; Koehring Co.; Koppers Co., Tar and Chemical Div.

LaPlant-Choate Mfg. Co.; A. Leschen & Sons Rope Co.; R. G. LeTourneau, Inc.; Lima Locomotive Works; Link Belt Co.; Littleford Bros.; Lone Star Cement Corp.; Lufkin Rule Co.; Mall Tool Co.; Marion Steam Shovel Co.; Master Vibrator Co.; McGraw-Hill Publishing Co.; National Colortype Co.; National Paving Brick Assn.; National Traffic Guard Co.; Novo Engine Co.; Osgood Co.; Pioneer Gravel Equipment Mfg. Co.; Portland Cement Assn.; Public Works Journal Corp.

R. B. Equipment Co.; Ransome Concrete Machinery Co.; W. A. Riddell Co.; Roads and Streets; St. Paul Hydraulic Hoist Co.; Schramm, Inc.; Scintilla Magneto Co.; Servicised Products Corp.; Signal Service Corp.; SKF Industries, Inc.; T. L. Smith Co.; Solvay Sales Corp.; Speeder Machinery Corp.; Sterling Machinery Corp.; Stover Mfg. & Engine Co.; Texas Co., Asphalt Sales Dept.; Thew Shovel Co.; Timken Roller Bearing Co.; Toncan Culvert Manufacturers Assn.; Trackson Co.; Truscon Steel Co.; Tuthill Spring Co.

Universal Crusher Co.; Walter Motor Truck Co.; Waukesha Motor Co.; White Mfg. Co.; Wico Electric Co.; Williamsport Wire Rope Co.; Gar Wood Industries, Inc.; Wood Preserving Co.; Wright-Dalton Machinery Co.

The Philip Carey Co.; Fruehauf Trailer Co.; Laclede Steel Co.; Macwhyte Co.

San Francisco Office Has New Branch Manager

The Chain Belt Co. of Milwaukee, Wis., has announced the appointment of B. E. Sivyer, Jr., as Branch Manager of its San Francisco office, located at 366 Brannan Street, San Francisco. Mr. Sivyer has been associated with the Chain Belt Co. for a number of years.

Slackford New P&H Adv. Mgr.

Announcement has been made by the Harnischfeger Corp., Milwaukee, Wis., of the appointment of E. T. Slackford as its Advertising Manager to succeed Wood Sanford. Mr. Slackford has been active in industrial engineering and sales promotion work for more than 10 years and will be in charge of advertising for the entire line of P & H excavators, cranes, hoists, motors, Smoothare welders and allied equipment.

Free Construction Manual For Salt-Stabilized Roads

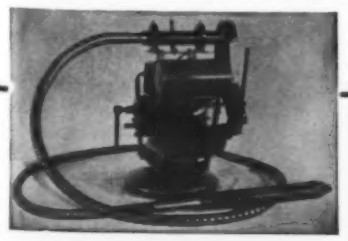
The Salt-Soil Road Bureau of the Morton Salt Co., Chicago, Ill., has published a Construction Manual which contains complete data on calculations for the use of salt by various methods for the stabilization of base and wearing courses of roads, the selection and grading of material and useful tables as well as helpful diagrams showing the cross-section of roads at the various stages of stabilization with salt.

This 25-page Manual, as well as copies of the Recommended Specifications and Bulletin on salt-stabilized base courses for bituminous surfacing, may be secured free from the Salt-Soil Road Bureau, Morton Salt Co., Morton Building, Chicago, Ill., by writing direct to the company and mentioning CONTRACTORS AND ENGINEERS MONTHLY.

PERFORMANCE-ACCESSIBILITY

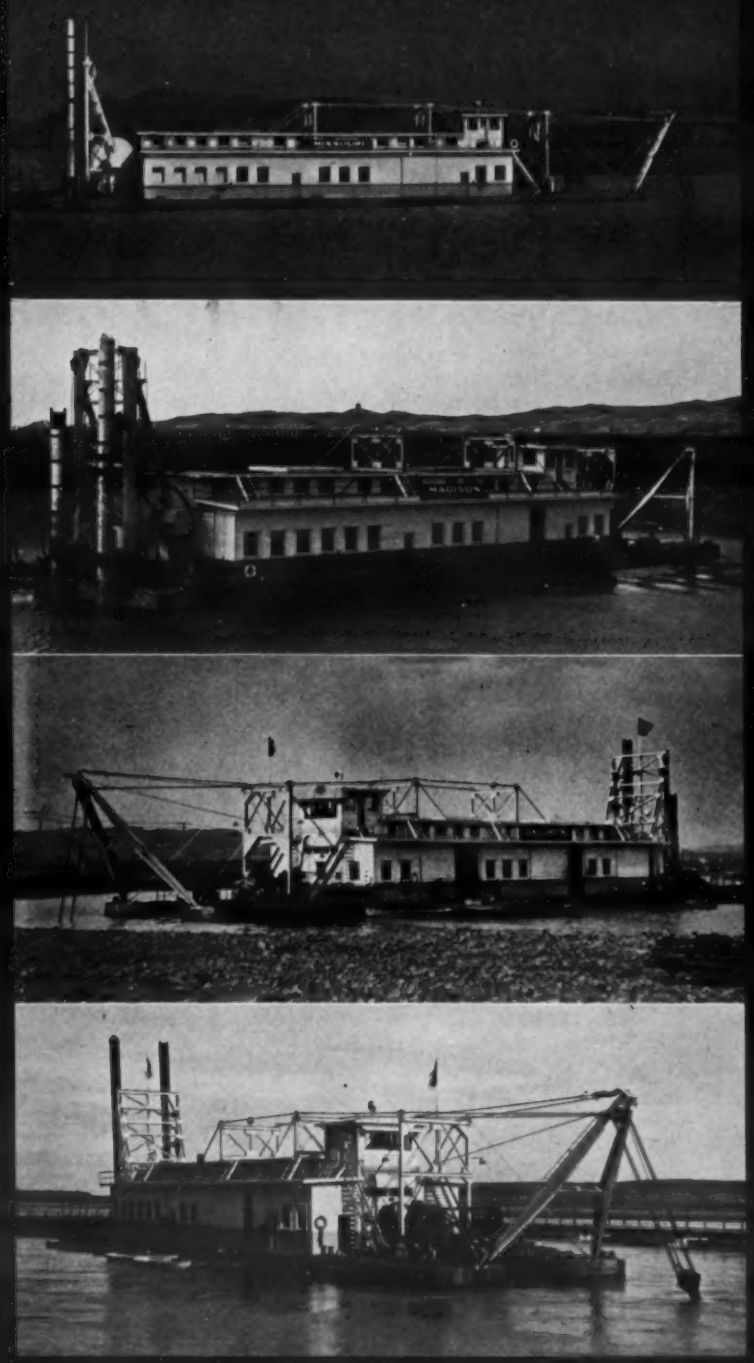
NEW
2" to 8" Self-priming Centrifugal Pump
See Bulletin 15

MARLOW PUMPS
Ridgewood, N. J.



Concrete VIBRATORS
AND GRINDERS
Write for Circular on types, sizes and prices
White Mfg. Co.
ELKHART INDIANA

BUCYRUS-ERIE



these four hydraulic dredges at Fort Peck Dam are built with Bucyrus-Erie pumps and digging equipment. On great hydraulic projects the world over, Bucyrus-Erie dredging equipment has proven its ability to give you bigger, steadier output, less grief, fewer delays, lower unit costs. Check into the savings Bucyrus-Erie dredges can make on your next job. Write:

BUCYRUS ERIE
EXCAVATING, DRILLING, AND MATERIAL HANDLING EQUIPMENT... SOUTH MILWAUKEE, WISCONSIN, U.S.A.

Rock Tunnel for Sewer Nears Completion in N.Y.

(Continued from page 2)

Drainage and Ventilation

The grade of the tunnel is downward toward the shaft, permitting drainage to a sump within the area of the shaft where a 4-inch Humphrey self-priming pump handled all ground water flowing from the tunnel and such surface water as leaked into the shaft.

The tunnel was ventilated by a flexible duck tube carried to within 50 feet of the heading and rolled back when shooting. A No. 6 Buffalo Forge Co. blower attached to a galvanized iron pipe at the shaft delivered air for ventilation to the duck tube.

Three pipes, laid along the left wall of the tunnel, carried high-pressure air for the drills in the top pipe, intermediate drainage pump discharge in the middle pipe and water for the drills in the lower pipe. On the right side of the tunnel were the electric lines for lighting. Power at 220 volts for the mucker which required 26½ kw was carried in a waterproof flexible cable laid along the right of the tracks.

A spare set of Gould storage batteries for the locomotive was set at the top of the shaft where it was charged by a Westinghouse battery charger. A Lima 101 crane served the shaft, lifting the loaded battleships as they reached the bottom of the shaft and dumping them into waiting Mack trucks. The crane also handled the spare set of batteries, and when the drill carriage was not in service and needed any repairs, it was lifted to the surface where ample space was available for fast work by the mechanics.

Personnel

Work on this tunnel section, which is part of the Ward's Island Sewage Treatment Works, was carried on by the contractor, Rodgers & Hagerty, Inc., New York City, under the supervision of John J. Hagerty, General Superintendent and Works Manager, with Frank W. Allen, Chief Engineer, David Bonner, Construction Engineer and William Kaufman, Field Engineer. Aubrey Curtis was Superintendent on this operation. For the City of New York, the project was under the direction of William F. Carey, Commissioner, Department of Sanitation; Walter D. Binger, Deputy Commissioner in charge of engineering and construction; Richard H. Gould, Chief Engineer, Sewage Disposal and Intercepting Sewers; Herbert M. Hale, Engineer of Construction, Ward's Island Project, and Leonard Johnson, Resident Engineer.

A New Safety Helmet To Protect Workmen

The new McDonald safety hat, recently announced by the Davis Emergency Equipment Co., Inc., 55 Van Dam St., New York City, is designed to protect workmen under the most hazardous conditions. The hat has a one-piece crown of Dural, a specially-hardened heat-treated aluminum alloy, which combines lightness of weight with resistance to blows. The moulded, slightly flexible brim is so designed that the hat is not easily knocked off, a particular protection to men working in close places.

Adequate ventilation is provided and the polished metal surface is claimed to reflect heat, making the head cooler when working in the direct rays of the sun. Other features of this safety hat are the floating interchangeable head band made of top grain cowhide; the moulded suspension lugs making the changing of head bands very simple; and the safety cradle which absorbs any blows.

Complete information on the McDonald safety hat is contained in Bulletin No. 801, which may be secured by interested contractors and engineers by writing direct to the manufacturer and mentioning Contractors and Engineers Monthly.

Asphalt Equipment Business Taken Over by L. H. Blouch

The business of the Asphalt Equipment Co., of Scottsdale, Pa., including all drawings, patterns and patents, has been taken over by L. H. Blouch & Co., River and Cove Roads, Merchantville, N. J., which company is now prepared to manufacture, erect and finance complete asphalt plants, as well as to furnish portable asphalt plants and specially-equipped plants for large tonnage to meet any requirements.

Members of the Asphalt Equipment Co.'s engineering, sales, mechanical and construction departments, who have had years of training and experience in this field, have become members of the new organization and will carry on the work in this department as the Asphalt Equipment Co. Division of L. H. Blouch & Co.

TENTS
TARPAULINS
WINDBREAKS

The Fulton line is sold through Contractor Supply Dealers in every state. A quality line priced right. Ask for SHUREDRY and FULTEX Tarpaulins, Tents, Windbreaks.

Write our nearest plant today for catalog, samples and price lists.

Fulton Bag & Cotton Mills
Manufacturers Since 1870
ATLANTA ST. LOUIS DALLAS
MINNEAPOLIS BROOKLYN NEW ORLEANS KANSAS CITY, MO.

MORE YARDAGE *per day*

because of power and less cable overhaul.

The super digging power of the Williams "Champion" Bucket is developed by an exclusive power-arm arrangement of lever and bitch-and-tackle.

The Williams "Champion"

Williams digging demons also include Power-Wheel, Multiple-Rope and Dragline Buckets. Write for bulletins.

THE WELLMAN ENGINEERING CO.
7012 Central Ave., Cleveland, Ohio

WILLIAMS BUCKETS

FORD INTRODUCES FOR 1937

2 V-8 ENGINE SIZES

85 HORSEPOWER FOR HIGH SPEEDS OR HEAVY DUTY

60 HORSEPOWER FOR LIGHT DELIVERY SERVICE

CHOICE OF POWER TO FIT YOUR NEEDS

With these two great V-8 engines, Ford offers a full line of optional equipment to apply power with greatest economy and to meet individual load requirements. These options make many combinations available, one of which will do your hauling or delivery job at the lowest cost. No compromise truck can give you such economy.

In addition, Ford introduces the most advanced style in truck design . . . and many other features that assure greater economy and longer life. Get the facts about this new Specialized Transportation from your Ford Dealer. Call him today and set a date for an "On-the-Job" Test.

Convenient, economical terms through the Authorized Ford Finance Plans of the Universal Credit Company

1937 FORD V-8 TRUCKS

Matching the HIGHEST in Quality...Selling with the LOWEST in Price

Settling Fill by Explosives

Placing of Fill Accelerated By Use of Explosives on New Baltimore-Philadelphia Highway

THE entirely new location for almost 40 miles of the Maryland portion of the Baltimore-Philadelphia highway, necessitated by traffic congestion on this main eastern seaboard thoroughfare, was selected partly because it did not involve a large amount of excavation in through cuts. It did, however, offer the problem of crossing seven considerable swamp areas, which were reputedly bottomless and impassable quagmires.

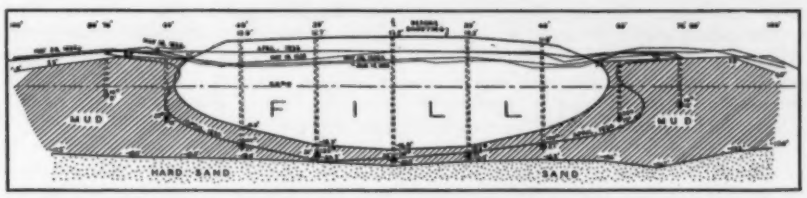
Although the railroad crossed these swamps, it did so at a higher elevation and even so, met with construction difficulties. When the railroad was built in 1860, the method of placing fill at swamp crossings was first to construct wooden trestles, then dump fill material through the trestling, continuing as the fill settled until the roadbed was up to grade. Even today, fill must be added as slow settling continues.

Surveys Made

In view of the success with which fill settlement has been accelerated by means of explosives in many construction projects in this country, it was decided to make a closer study of the proposed route south of the railroad line, relying on modern explosives technique to bring the time of fill settlement within economic limits. Accordingly, five survey parties were sent into the field.

The new road is to be 90 feet wide, including two 20-foot roadways and a 30-foot central parkway. A tentative center line was established, except where the new highway crossed the swamp areas. At these points, a special crew, equipped with boring and sounding instruments, was organized to secure more information as to the best location. Starting from the edge of the railroad fill, this crew worked out into the swamp perpendicular to it, taking borings to find a point at which there was a minimum amount of water and mud. After establishing a number of such points across each swamp the center line of the new road was located and tied in with the center line at the edge of the swamps. When the preliminary survey was completed, penetration tests and borings were made to locate hard bottom and to determine the character of material every 50 feet along the center line.

When the new location was approved by the Federal authorities, construction was started as PWA and NRH projects. Contracts for grading and draining the several sections of the road were let to contractors by public bid, but the breaking up of the swamp mat and the acceleration of fill in the swamp area was done by the State Road Commission forces.



A Progress Record of One Point on the Line Where Underfill and Relief Shooting Were Employed to Obtain Settlement

The contracts were so written that the fills across the swamp areas were to be placed in unison with the work of breaking swamp mat and accelerating fill. As contractors were working on all swamp areas at the same time the forces handling the explosive work for the state had considerable difficulty in carrying on the fill acceleration to avoid delaying the contractors. However, as soon as the procedure was established, the work was carried through with speed and efficiency.

Shooting the Mat

The engineers started shooting the mat in a 90-foot width, the actual width of the road, but found after several shots that better results were obtained by blasting a 125-foot width. Bush and Church Creeks, two of the seven swamps, accordingly were shot in the 125-foot width, but the other swamps had to be shot in 45-foot widths because of the closeness to the railroad right-of-way.

Charges of one to three 1¼ x 8-inch cartridges of 50 per cent Hercules Straight N. G. dynamite were placed in the mat, the amount of the charge depending upon the growth of the mat and the results of test shooting. Lines of holes parallel to the center line and 5 feet apart were laid out, with the holes in each line 1 foot apart.

Total Pounds of Dynamite Used In Shooting Mat

Winters Run Swamp	6,582
Gun Powder Swamp	2,418
Ha-Ha Swamp	9,723
Otter Creek Swamp	14,052
Bush Creek Swamp	35,808
Church Creek Swamp	8,413
Total	76,991

Placing Fill

After the mat was liquified, the contractor began placing the fill, carrying it forward in the shape of a wedge. In many instances it was found that the best results were obtained by firing torpedo shots immediately in front of the fill. The torpedoes were made with 2 x 2-inch poles, 12 to 15 feet long. First, four cartridges were tied about the end of the pole, one on each face. This was continued along the length of the pole until 40 cartridges of 40 per cent Her-

(Continued on page 25)

Dirt-Moving Costs Cut To the Bone—

WITH a Sauerman Slackline or Drag Scraper you can dig to a depth of several hundred feet, whether in dry ground or under water, and haul the excavated material any distance up to 1500 ft. at a cost of a few cents per cubic yard. Sixteen different sizes with handling capacities from 10 to 600 cu. yds. per hour.

Write for catalog telling all about these money-saving machines.

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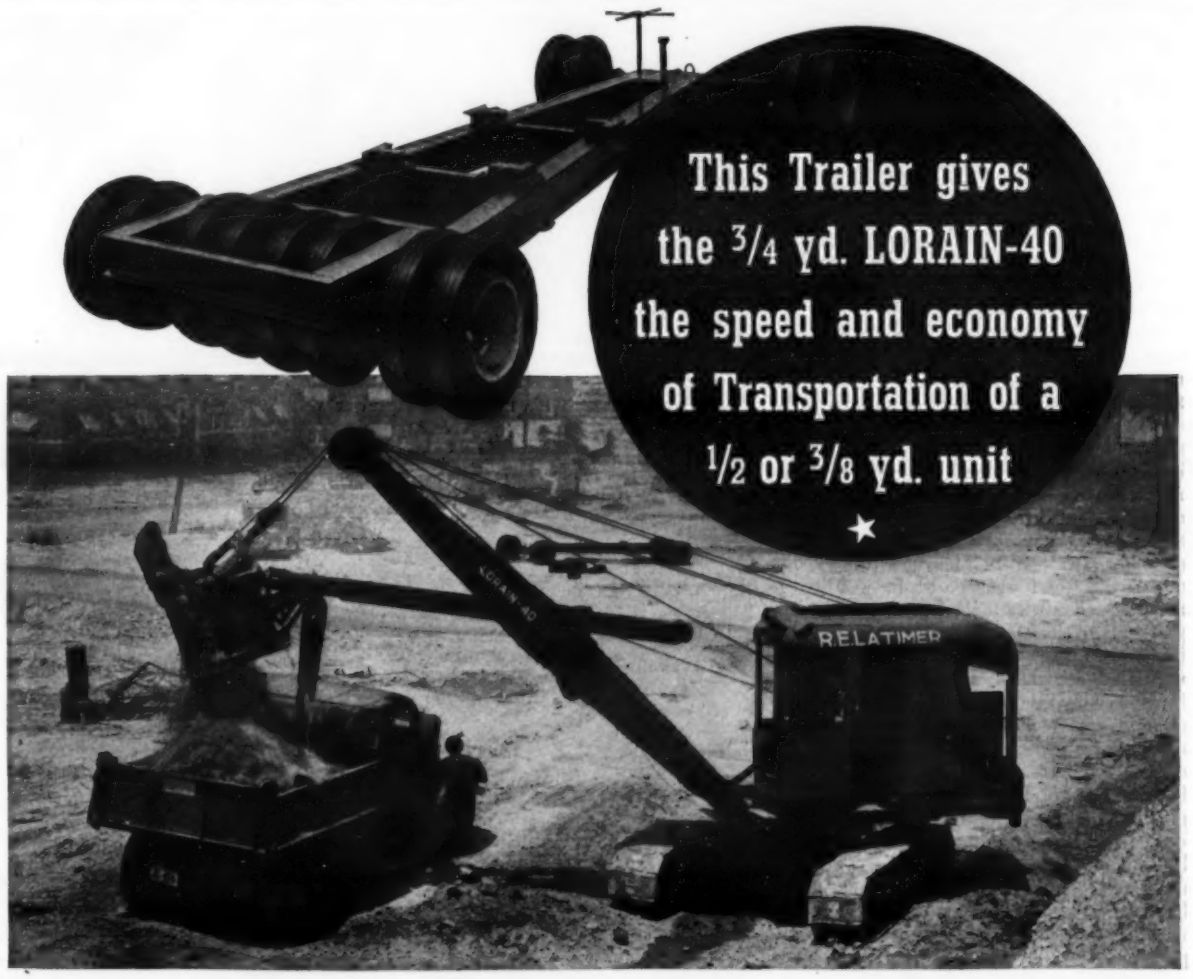
464 S. Clinton St., CHICAGO



★ This trailer enables you to enjoy the greater earning power and production of a ¾-yd. machine without the loss of any of the transportation qualities of a smaller unit—In the first place, the Lorain-40 is built on the principle that Capacities depend on Stability and Strength, not Weight; as a consequence the Lorain-40 handles a ¾-yd. dipper efficiently, yet in weight and price it approximates most ½-yd. units—Secondly, you can move the Lorain-40 as easily, speedily and economically, as any ½-yd. or smaller unit. This single-purpose trailer, specially designed for the Lorain-40, can be loaded or unloaded in 10 to 15 minutes; is light and inexpensive; can be towed by a small high-speed truck. Such fast, low-cost transportation is another reason why the Lorain-40 is the fastest selling ¾-yd. machine on the market. Write for full details today.

THE UNIVERSAL CRANE CO. • LORAIN, OHIO

Engineer Recalls Mexico Experiences

(Continued from page 2)

nearly throwing him into the path of the bus. Obviously neither of them had ever seen a bus and possibly not an automobile. This meeting of the fourteenth century Indian with such a twentieth century apparition was only one of the many conflicts of time and place of which I can bear witness.

Heavy Rock and Earthwork

Work finished, more orders from the capital moved me to Chapulhuacan and thence to Tamazunchale. Heavy earthwork was being carried on in these sections. Side-hill cuts run for miles as a tiny rock ledge gashed from a frowning mountain on the one side, with a yawning abyss on the other. Every inch of this section was hard fought for. Men had to be lowered by ropes down an almost vertical cliff to drill the dynamite holes for shooting. The geological structure is a highly folded and faulted sedimentary formation. Frequently, therefore, the ensuing rock slide would follow a plane of weakness and carry road and everything else down the canyon, leaving us with another smooth wall to shoot with no more assurance of success than formerly.

Many prominent men have said that no road could be built: but the road is built! Now some men are saying that the road can never be maintained, but Mexican perseverance and ingenuity is as versatile as a Yankee's and I say that the road will be maintained! There will be more rock slides: more water will seek into cracks and crevices and disintegrated shale and another stratum of limestone will slide in its direction of dip and tear a gap out of the road; but the road will simply be blasted again and again until it bites into a stable formation. Ditches are dug to conduct the water away from cleavage planes, and as the road grows old in public service, rock slides will be fewer and farther between.

After shooting a quantity of rock, men with crowbars move the larger pieces to the edge and, fascinated at the sight, watch them roll down often a thousand feet, creating little landslides as they go. Other crews of men with pick and shovel handle the fragments: there is little overhaul in these sections. The highway authority has a few old Northwest gasoline shovels but with labor prices as they are and because of the inaccessibility of many locations, the field of action of the rigs is limited. Occasionally they become buried and have to be dug out.

The ruling grade through these mountains was intended to be 6 per cent, and only in a couple of instances was it exceeded and then only by a fraction of 1 per cent. For all practical purposes it may be said that 6 per cent is the ruling grade of the Inter-American Highway. By way of contrast, the single lane road over this route had a 23 per cent grade near Tasquillo and two years ago when I road on a bus over this grade, a little boy walked and ran behind the bus with a large rock to be thrown under the rear wheels should the brakes fail!

A Few Days Off

Back to the capital for further orders. Saturday night a tea dance at the Swiss Club with a British school teacher, Sunday afternoon at the bull ring, Tuesday night at "Fronton" or Jai Alai, Wednesday morning en route to division headquarters at Valles via San Luis Potosi, a 1,000-kilometer trip by rail (now only 500 kilometers by highway). Stopped overnight at San Luis Potosi to take in a circus and carnival. Next day two boys from the States were in my car marveling at the grandeur of the mountain scenery. Enjoyed speaking English for a change as we passed through six or seven tunnels and on occasion could see three elevations of rails and on curves could see both engines and the caboose of our train from the car window.

Work in Jungle Country

Down 5,000 feet in that day's ride. The boys from the States were delighted with their first taste of rank tropical jungle. They spent the late afternoon discovering orchids on banana plants and I didn't disillusion them. We put up for a few days at Division Headquarters. Then orders came through with plans and specifications for the construction of the foundation of a 565-foot three-span steel bridge over the Tampaon River, some twenty-odd kilometers south of Valles. I'd had a little experience in foundation work in open well caissons in St. Louis, Mo., and in cofferdams on the Green River in Kentucky so the prospective job seemed simple enough.

In the tropical jungle country known as the "Huasteca" malaria was prevalent and the doctor in Valles recommended "Arsi-Quinina" every night for a week, then skip one dose. In perfect physical condition, drinking boiled or bottled water only, and with the quinine, I enjoyed good health in the atmosphere which made others dull and lazy. I would rise at 6:30 to 7 a.m., inspect the job, chat with the day superintendent, eat breakfast at 9 a.m. and interpret plans and design forms until 1:30 when I would eat a heavy meal, and then take a nap. At 3:30 I would awaken, swim in the river, put on fresh clothes and go over the job again. Supper at 7:30 or 8 p.m. I would work up all progress reports and other paper work at night. We had a 110-volt electric light plant and toward the end of the job we worked night and day.

The two dry land abutments were

(Continued on page 21)

ROAD FORMS

BLAW-KNOX

Equips the Road Builder

Here is equipment, trouble-free and speedy—made to reduce construction costs. It has been tried and proved on many jobs. ¶Blaw-Knox is ready with this complete line of thoroughly modernized construction equipment—new developments ready to do jobs faster, cheaper and better—tuned to today's construction methods.

Buy new, *buy* now—insure your profits.

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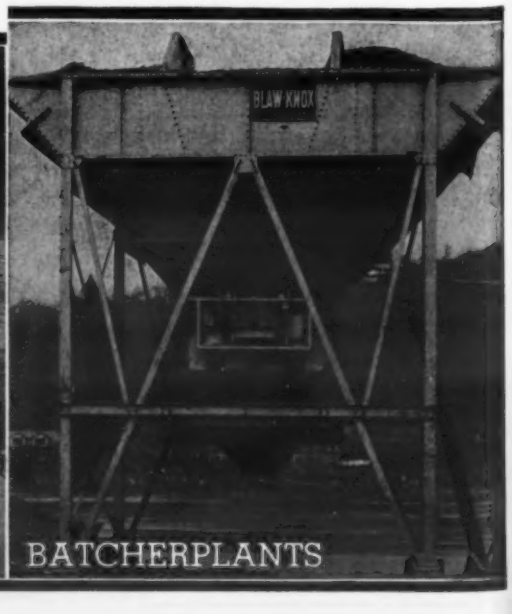

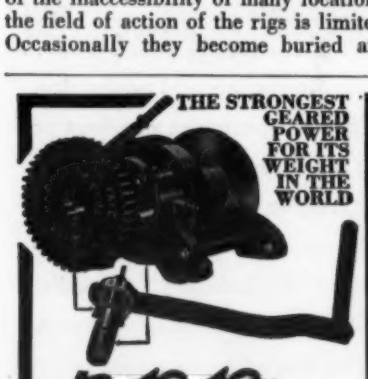

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"For use where power is not practical or available"

Manufactured in 2, 5 and 15-Ton Sizes. For capacity comparison, ½" cable used:
2-Ton "Lightweight" ..... 75 ft.
5-Ton "General Utility" ..... 250 ft.
15-Ton Triple-Geared "Special".....1200 ft.
Patent instant gear change and positive internal brake that never fails, and will lock load.

Gear Ratios	Weight	Price
2-Ton 4 & 22 to 1	60 lb.	$50
5-Ton 4 & 24 to 1	110 lb.	$75
15-Ton 4, 19 & 109 to 1	690 lb.	$200

BEEBE BROS.
2724 6th Ave., So., SEATTLE, WASH.
Warehouse stocks for dealers' supply: Seattle—Chicago—Brooklyn—Houston. Complete Literature and List of Dealers in Principal U. S. Cities and Foreign Countries Gladly Mailed.

Dubois County Erects Own Timber Bridges

(Continued from page 9)

M.F.B.M. If commercial creosoted timber had been used the cost would have been about $60.00 per M.F.B.M.

Erection of Structures

These bridges were framed and erected by a county bridge crew working under the supervision of the county surveyor who also serves as highway supervisor. The bridge crew consisted of a foreman, carpenter, truck driver, and from one to three common laborers. They removed the old structure, constructed the new one and made all approach fills necessary to complete the structure in from two to five days time, depending on the size of the structure.

I-beams were used for stringers on all structures having a span of 14 feet or over and the 3-inch flooring was fastened to the I-beams with cleats which locked the individual plank to the stringers and to each other. The roadway was determined by the type of road on which the structure was built and all structures on improved roads or roads which would be improved soon were constructed with not less than 18 feet of roadway.

These structures have proved very satisfactory and their construction will be continued in the future. Their life is estimated, on the basis of the life of several old structures in the county, at a minimum of fifteen years when native oak lumber treated with creosote as described in this article is used. Many of the southern and western states use pressure-creosoted timber structures in their state highway systems and find them very satisfactory.

From a paper presented at the Twenty-Second Annual Purdue Road School.

Cost Analysis of Timber Structures

Span (Feet)	Roadway (Width in Feet)	†Height (Feet)	*Lumber	‡ I-Beams	Hardware, Paint, etc.	Labor and Trucking	Total Cost
10	18	6	$ 69.65	$	$1.10	$41.45	$112.20
12	18	7	65.03		1.50	50.35	116.88
14	18	7	77.22	60.70	2.50	52.90	193.32
16	18	6	65.83	62.40	6.00	58.00	192.23
18	18	7½	124.20	86.23	8.50	90.60	309.53
20	18	7	89.25	87.75	9.40	56.00	242.45

†The figures under the heading "Height" show the distance from the bottom of the footing to the top of the floor.
*The quantity of lumber used varied greatly due to the sizes of the wings used with the various structures.
‡ 4x10-inch timbers used for stringers on 10 and 12-foot spans.

and the conditions under which the work is done, but should adhere closely to the following costs on this FAP 208-376C:

Item	Cost
Air compressor, tools, operator, 25 hours	$112.87
Labor, 112 man-hours	67.50
Truck and equipment	16.00
Insurance	13.69
Embeco aggregate, 300 pounds	25.65
Portland cement, 1,200 pounds	7.50
Sand and stone, 4,500 pounds	4.75
Maintenance of detour	22.00
General overhead	13.75
Total	$283.71

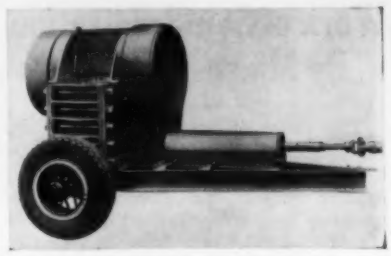
While the cost per square foot, $1.41, seems rather high, the savings over other methods are considerable.

Examination of the completed work after it was subjected to considerable temperature variation and traffic impact reveals no apparent failure.

A New Trailer Crusher

A 2-wheel trailer crusher has recently been added to its line of portable crushers by the Eagle Crusher Co., Galion, Ohio. This crusher may be drawn behind almost any type of tractor and driven from the rear power take-off through a universal joint shaft.

The frame of the Eagle Trailer is of heavy channel steel, entirely electric-welded. The low overhead eccentric shaft adds to the force feeding and capacity. The disc type balance wheels, the large feed hopper and steel guards over the multiple V belt drive and drive shafts are designed not only for convenience of operation but also for the safety of the operator.



The Eagle Trailer Crusher

The overall height is only 62 inches, providing a low feed opening but still maintaining sufficient underneath clearance. This trailer crusher may be furnished with pneumatic tires or 30 x 8-inch steel wheels. The hitch is made adjustable for tractors of different drawbar heights.

New Method of Repairing Damaged Concrete Road

(Continued from page 2)

made and thinned to a creamy consistency. Application was made to the exposed surfaces of the prepared areas with a stiff brush to serve as a primer and waterproofing agent.

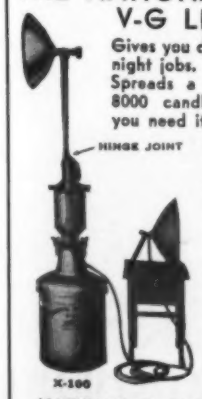
The Embeco concrete was then proportioned by weight, using nine parts pea gravel, six parts sand, four parts portland cement and one part Embeco, with sufficient clean water to make a workable mix. The concrete was placed immediately after the waterproofing treatment, and complete consolidation was obtained by thorough spading and screeding. Finishing was with a hand float, straight-edge and final brushing to match the original surface. Curing was by wet burlap for 48 hours before opening to traffic.

Costs

The cost may vary with the locality

THE NATIONAL CARBIDE V-G LIGHT

Gives you daylight conditions on night jobs.
Spreads a full, even beam of 8000 candlepower right where you need it.



Lights up the job for twelve hours on one 7-pound charge of National 14-ND Carbide and 7 gallons of water. Is easily handled by one man; has nothing to get out of order; no harm done if it tips over—just stand it up again, and it goes right on working. Weight 35 lbs. empty; 98 lbs. when full.

Write for catalogs on V-G Light, V-G Handy Light and Lantern

NATIONAL CARBIDE CORPORATION
LINCOLN BLDG., NEW YORK
(Opp. Grand Central)

Weather and ground conditions were unfavorable—but this contract on the Tygart Dam project went through on schedule. The contractor put five sure-footed "Caterpillar" Diesel Tractors to work—and hauled his loaded wagons in tandem, licking bad grades, deep and sticky mud, and carrying full loads.

Not even adverse working conditions keep "Caterpillar" Diesels from making new records daily: hauling and bulldozing at 25 to 40% of former fuel costs; maintaining low up-keep costs even after 8000, 10,000 and more hours, living up to faster schedules than ever before possible. There's a "Caterpillar" dealer near you—he'll help you figure what "Caterpillar" Diesels can do for you. Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

CATERPILLAR
REG. U. S. PAT. OFF.
DIESEL

Work of Standardization By Mixer Mfrs. Bureau

The value of keeping alive a cooperative standardization program during the depression is illustrated by the work of the Mixer Manufacturers Bureau working in conjunction with the Associated General Contractors of America, Inc. During this period, the engineering skill and resources of the concrete mixer manufacturers were turned to increasing the efficiency of standardized sizes.

Accordingly, two new types of concrete mixers were developed, the 7-S and 10-S end-discharge machines, both 2 and 4-wheel mounted. These machines were brought out by practically all the manufacturers. In addition, most manufacturers developed some new designs for the 3½-S tilter and several new ones were also introduced. New 28-S and 56-S machines were designed, developed and produced by several manufacturers. In all, fifty new models and two new types of machines were introduced, but in no case was there any deviation from the A.G.C. ratings.

The Sign of a Good Mixer

This adherence to the standardization program proved of immeasurable benefit to the whole construction industry. With the coming of better times, the mixer manufacturers were ready and able to keep construction forging ahead. There were no costly delays while manufacturers were making up their minds what sizes to produce, allowing construction money to be diverted into other channels.

In addition to bringing out these new models, concrete mixer manufacturers equipped their machines with pneumatic tires, and built them stronger, yet lighter in weight by the use of alloy steels. The vertical tank was universally adopted and many other improvements were made in bearings and drives. By concentrating their efforts on these standardized sizes, the Mixer Manufacturers Bureau has been able to give the builders better concrete, the contractors cheaper concrete costs and a more flexible machine to use with longer life. While the manufacturers themselves have of course benefited by this standardization program, it has probably been to a lesser degree than the many benefits which their cooperative action has brought the construction industry.

Organized in 1924, in cooperation with the A.G.C., the Mixer Manufacturers Bureau has reduced the sizes of concrete mixers manufactured from thirteen to six for the building industry and from six to two in the paving industry, within the range of 1-yard machines. Today, the members of this organization are producing more than 90 per cent of the machines made in America.

Each member of the Bureau, upon compliance with the standards agreed upon with the A.G.C., is granted the privilege of affixing a brass plate to the machines manufactured. This plate attests to the proper mixing ability of the machine and its standard rating with a 10 per cent additional margin.

Grade Crossing Hazards Being Removed Rapidly

The elimination of railroad grade crossing hazards at an unprecedented rate has been made possible by the allocation last year of $200,000,000 of emergency relief funds for that purpose, according to the U.S. Bureau of Public Roads. With these funds alone, the Bureau reports, 2,097 existing grade crossings will be eliminated, 320 old grade-separating bridges will be rebuilt, and 1,037 crossings will be protected by the installation of safety or warning devices.

Of the 2,097 grade crossings to be eliminated, 1,579 will be wiped out by the construction of bridges to carry the highways under or over railroads; the remaining 518 will be avoided by relocation of the highways.

As evidence of the greater emphasis laid upon grade crossing improvements during the past year, the Bureau points to the fact that nine grade separation structures, in addition to those mentioned above, will be built with emergency relief funds allocated for highway construction; and the 1,908 new and rebuilt structures planned in the single year are compared with the total of 728 structures planned to be built with other Federal funds appropriated since 1933, and earlier smaller programs.

The greater part of the programmed work, involving an estimated cost of $112,929,765, was under contract on October 1 and in various stages of construction. Of the remaining programmed projects, plans have been completed and approved by the Federal Bureau for 174 new and 36 reconstructed structures, 79 highway relocations, and 624 protective installations, estimated to cost $27,816,526. These projects will go under construction as soon as the contracts can be let.

The Bureau reports that grade-crossing projects have furnished direct employment in recent months to an average of 40,000 men, and it estimates that indirect employment in the production and transportation of materials and equipment in the same period has been given to an additional 68,000 men.

Mixer Catalog Celebrates 25 Years of Manufacture

Appropriately dressed in a silver cover to symbolize twenty-five years of business, the new catalog of the Construction Machinery Co., Waterloo, Iowa, has made its appearance. It is a clear and interesting presentation of the company's line of concrete mixers, plaster and mortar mixers, hoists, pumps, saw rigs, pneumatic-tired concrete carts and wheelbarrows.

The catalog emphasizes the change in equipment, in the twenty-five years that the Construction Machinery Co. has been in business, from the old, clumsy, overweight, crude units to the sleek, fast, compact, easily transportable units of today. This catalog which features Master and Silverstreak non-tilt mixers will be sent to any readers writing direct to Construction Machinery Co. headquarters at Waterloo, Iowa, and mentioning CONTRACTORS AND ENGINEERS MONTHLY.

Angledozer lifting snow up and over roadside drifts near Galva, Illinois.

Work the winter through with LeTourneau Equipment

The fast-acting cable that controls the digging and spreading of LeTourneau Carryalls, that makes possible the high, powerful lift of LeTourneau Angledozers and Bulldozers, is unaffected by weather. It rolls fast and free at all times, keeping LeTourneau equipment operating at high efficiency, enabling LeTourneau users to work in temperatures that freeze out other tools. Typical winter experiences:

192 Yards Hourly

On Blanchard Brothers' Rocky Mountain contract last winter the ground was frozen two feet deep so it worked like sandstone. Blanchard Brothers put a LeTourneau Rooter to work there, ripped up the frozen ground, moved it with LeTourneau 12-Yard Carryalls. On a 2,200-foot round trip haul with a tandem hookup of two 12-Yards behind an RD8, they hauled from both ends of a fill to the middle, moved 192 yards hourly in 6 round trips.

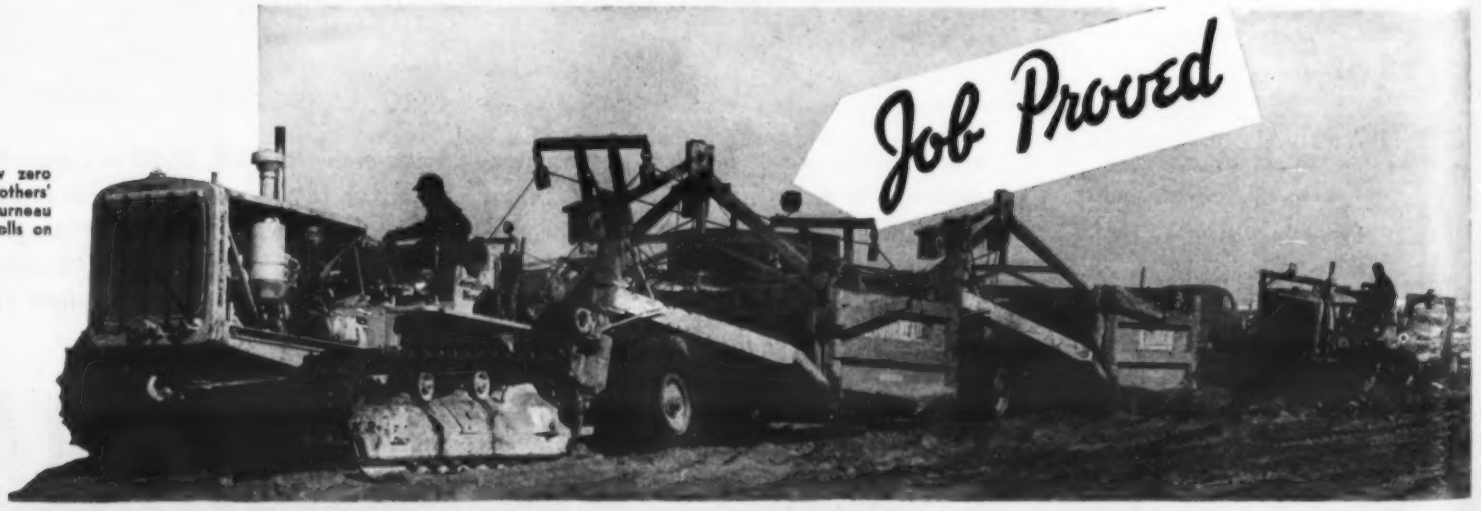
Snow Removal in Winter

In fair weather the North American Engineering Company moves plenty of earth with LeTourneau Angledozers. Last winter this firm put Angledozers to good use freeing Illinois highways of snow drifts. Particularly helpful was the high lift which enabled the Angledozers to lift the snow up and over roadside drifts that had stopped other equipment.

Like these users, many another LeTourneau user has kept his job rolling right through zero weather, rolled up profits while other equipment was winter-bound.

Ask your Caterpillar tractor dealer to show you what LeTourneau equipment can do for you.

Manufacturers of: Angledozers*, Buggies*, Bulldozers, Carryall* Scrapers, Cranes, Drag Scrapers, Power Control Units, Rooters*, Semi-Trailers.
*Name registered U. S. Patent Office.



Twenty-five below zero on Blanchard Brothers' job, but this LeTourneau equipment rolls on steadily.

R. G. LeTOURNEAU INC PEORIA, ILLINOIS • STOCKTON, CALIFORNIA

Cable address: "Bobletorno"

Watchdog Needed For County Money

Marion County, Ind., Provides an Adequate Office Staff for Checking All Budget Money Supplementing County Auditor

By C. G. BERRY,
Office Deputy, Marion County, Ind., Surveyor and Road Supervisor's Office

KEEPING records in the county road department is a very important operation and utmost care should be exercised in its handling.

Counties in Indiana receive a sum of money to maintain their roads and bridges from the state gasoline and license fee fund. This amount is determined by the population and mileage of the county and the approximate amount to be received can be determined in advance. In Marion County, we make a budget of our anticipated expenditures about six months previous to the time that we actually make the expenditures. It is very important that we stay within our budget. Therefore, we deem it necessary to have a watchdog, so to speak, that we may know at all times just where we stand and do not have to wait until our county auditor can get us the information regarding the various appropriations.

The county auditor has many accounts to keep track of and it is to be expected that he will not keep as detailed a report as we would like to have.

There should be someone to keep a record of what requisitions have been issued, to whom and for what. He should keep track of all moneys expended in the county road department. Also, he should know on what roads metal was placed, from whom purchased, and by whom hauled. When material is delivered, he should get a signed delivery ticket. When the claim is filed, this delivery ticket is necessary as a check on this claim. There is gasoline and oil to keep track of, where culvert pipe was placed, and so on.

Marion County Practice

In Marion County, we have some forty different appropriations that make up our road fund. When we buy something, we issue a requisition to the party from whom we purchase, showing the material purchased and the amounts expended. This requisition is entered at once in a ledger showing the date, to whom it is issued, the order number and the amount of such purchase. The amount expended is deducted immediately from the previous balance so that at all times the amount of money left in that particular appropriation is visible. Whenever anything is delivered, we require a delivery slip and when the claim is checked up these delivery slips are attached to the invoice and claim before payment is authorized. Before anything is purchased, a requisition is issued to that party, or the invoice, or claim, is not allowed. We have a county yard from which the major portion of our work is allotted and from where all trucks and equipment are maintained.

We also have eleven district men who have a tractor and maintainer, each, whose duty is to maintain the roads in their districts. We have daily report cards which are mailed in each day from district men showing what roads were worked on, gasoline and oil consumed, miles traveled with tractor and maintainer, and the men who worked and what they did.

At the end of the month the district men's payrolls are checked from these cards. Each district man has a time and record book in which he keeps all his records until sent to the main office.

Marion County Highway Dept.

TRACTOR REPORT

_____19____

Tractor No.	
Driver	
Township	
Miles traveled	
Gas on hand	Gals.
Oil on hand	Gals.
Gas purchased	Gals.
Oil purchased	Gals.
Total Gas	Gals.
Total Oil	Gals.
Gas used	Gals.
Oil used	Gals.
Should have Gas	Gals.
Should have Oil	Gals.
Short, Long, O. K.	

The Tractor Report Kept by the District Maintenance Men

DAILY REPORT

Date_____19____

Dist. No._____ Road No._____

Gas	Used	Oil	Used	Grease	Used
	Received		Received		Received
	On Hand		On Hand		On Hand

Miles	Traveled	Repairs	Hours
	Graded		Parts

Time: From_____M. to_____M. Hours_____

Condition of Roads_____

Name_____ Hrs._____ Rate_____

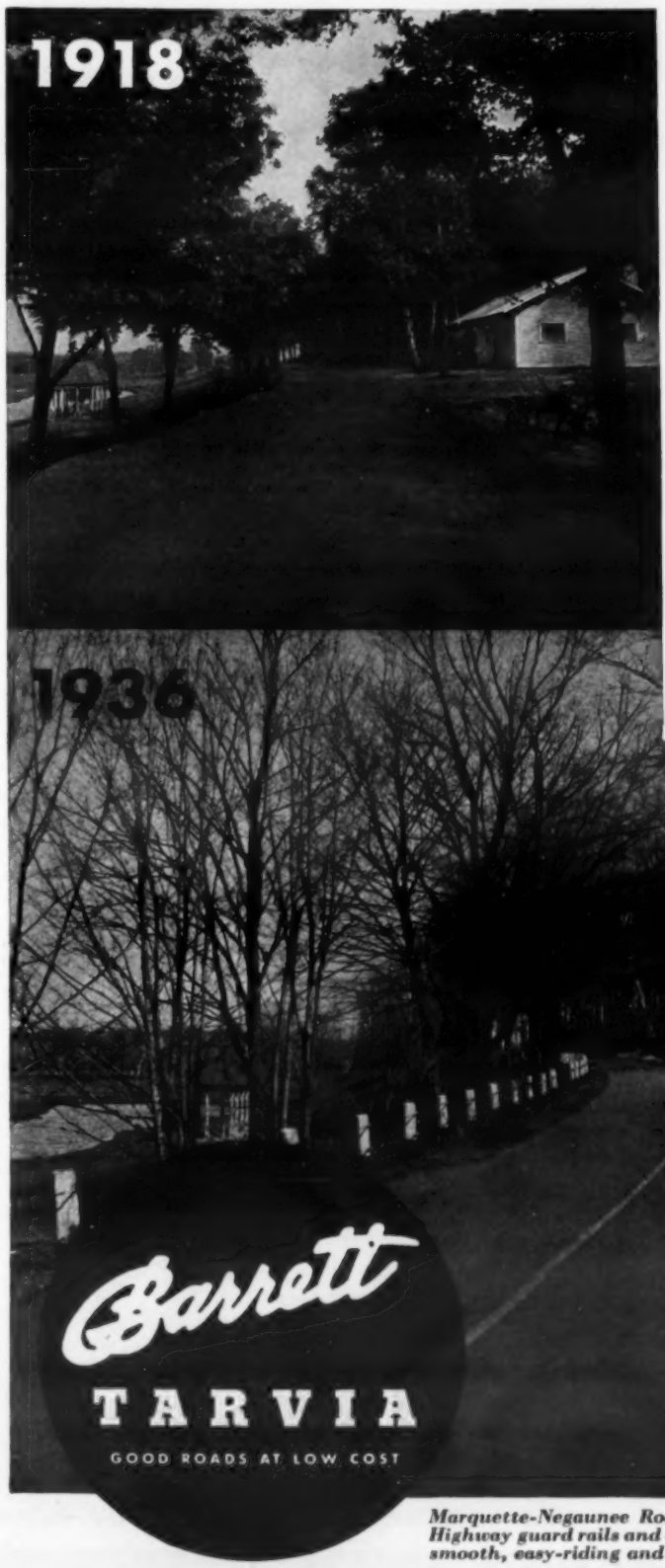
Signed_____

Wm. B. Burford Printing Co., Indianapolis—735

The Daily Report Card Sent by the District Maintenance Men to the County Office Which Makes Available Accurate Information on the Status of Work on Marion County Roads

We have a daily yard report which shows materials received, gasoline and oil used by each piece of equipment.

(Continued on page 20)



BEFORE completing your 1937 road plans, talk your problems over with the Tarvia field man. He represents America's oldest and most experienced manufacturer of coal-tar road-building materials. His special training plus your own knowledge of local conditions may result in more miles of good road on next year's budget. Tarvia types combine ease, economy and speed in construction and maintenance operations—assure the maximum mileage of durable, easy-riding, skid-safe highways from road funds available. Phone, wire or write our nearest office.

Marquette-Negaunee Road, Marquette County, Michigan. Tarvia since 1918. Highway guard rails and a traffic line have been added but the Tarvia road is as smooth, easy-riding and skid-safe today as it was eighteen years ago.

THE BARRETT COMPANY New York Chicago Birmingham Philadelphia Boston St. Louis Cleveland Minneapolis Lebanon Milwaukee Detroit Baltimore Columbus Youngstown Toledo Buffalo Providence Syracuse Hartford Cincinnati Bethlehem Rochester Portland, Me. Norwood, N. Y. In Canada: THE BARRETT COMPANY, LTD. Montreal Toronto Winnipeg Vancouver

Town Beat County In Buying Plow

With 10-Foot Drifts Ahead Town Board Felt Need For Heavier Snow Plow, Bought Unit Under County Nose

THE Town Board of Thompson, New York, put across a real deal last winter with its purchase of a new 175-hp Linn tractor snow plow. The giant plow was at Monticello, N.Y., for a demonstration before the Sullivan County Highway Department when the Town Board closed the deal and took over the plow at once, putting it into immediate service.

With the new plow, the Thompsonville Road which had been snow blocked for several days was opened and a marooned automobile, stranded in the middle of the highway in an 8-foot drift, released.

The storm in the last few days of January was the worst in several years with its 21 inches of snowfall. The Town's 20-ton tractor on which was mounted a snow plow had broken down and a 17-ton plow similar to, but smaller than, the new one, proved inadequate to battle the 8 and 10-foot drifts. More than 70 miles of snow-bound roads were opened in one day with the larger plow with its 175-hp gasoline motor and its ability to travel at the high speed of 12 miles per hour.

The tractor is not laid off during the spring, summer and fall but is kept busy hauling excavation and grading. Harry Sniffin is Road Superintendent for the Town of Thompson, N.Y.

The Town of Thompson's Linn Tractor Snow Plow Breaking Through Giant Drifts Last Winter

Oil Heater With Pump

An oil retort designed to heat all grades of road oil from the heaviest asphalt to cut-back asphalt to the proper temperature for distribution on the road has been announced by the Dallas Machine & Locomotive Works, Dallas, Oregon. This Gerlinger oil retort consists of a cast iron combustion chamber and cast iron fire box. The 2-inch heating coils are mounted on cast iron supports within the combustion chamber with baffle plates to direct the heat over the entire coil. Heat is furnished by a gravity-feed steam-atomizer oil burner. There are two glass front thermometers, one at the inlet of the coils and the other at the outlet so that the operator may have complete control of the temperature of the oil at all times.

The 6 x 5 x 6-inch Duplex steam pump is designed to pump heavy oils at high temperature and with the heater has a capacity of 3,000 gallons per hour. The unit is portable.

New Atomizers, Nozzles for Paint Spraying Guns

Improved atomizer heads and fluid nozzles for paint spray guns have been announced by the Paint Spray Equipment Division, Alexander Milburn Co., 1493 W. Baltimore St., Baltimore, Md. The fluid nozzle is made of a special grade, wear-resisting steel with an unusually long tapered seat, accurately machined and burnished for perfect alignment with the atomizer head. Closely spaced large passages increase the air supply to the atomizer head, improving the atomized spray. The nozzle seats on the base of the thread of the head which keeps paint or other material entirely out of the threads, eliminating the clogging common to spray guns.

The bronze atomizer head is in one piece with straight air passages eliminating friction and making it easy to clean. These new fluid nozzles and atomizer heads are manufactured for siphon or force feed and in sizes and styles to handle any type of material for spray painting.

"ANCHOR" PULLER JACK

THE ONE-MAN OUTFIT OF A THOUSAND USES

The most widely used Pulling-Jack in America. Comes in handy every day. Works in any position. Pulls 6000 lbs. single line; 10,000 lbs. on two line. Pulls anything—concrete forms, piling, lagging. For handling heavy machinery. Joins pipes, belts, conveyors. Stretches cables. For erection, rigging or demolition work, or what have you.

Complete outfit as shown; includes sheave block for changing direction or doubling power. Price $20.00. Net weight 70 lbs. Simple, rugged, powerful, long-lasting. Longer chains if desired.

EDELBLUTE MANUFACTURING CO.
Reynoldsville, Penna.

BAY CITY PERFORMANCE HAS SOLD OUT PRODUCTION FOR MANY WEEKS AHEAD

and still the orders pile up!

for Bay City

"20"

full revolving—full 3/8 yd. bucket—safe 4-ton crane loads . . . . . .

Yes—we're chock-a-block with orders for weeks ahead, and proud of it! It goes to prove that Bay City "20" is the biggest buy in small shovels today. For here's a "Big-little" shovel that has features of construction and operation found in no other ⅜-yarder. It tops its field in its weight and class. Look over these features—use your own judgement!

Compact Design—Yet plenty of elbow room.
Elimination of useless "dead weight"—by alloy steels and heat treating.
Anti-friction bearings—on all machinery shafts and boom point sheaves.
Chain Crowd—positive and independent—costs more but worth it.
Drop Forged crawler shoes (14" wide) long wearing life.
Unit Cast Car Body and Machinery Table of nickel-manganese steel, totally heat treated—available on no other light ⅜ yd.
Six cylinder gasoline or Diesel Power—"E-Z" Clutch Control.
Cut Helical Gears on all drum shafts—Helical gear drive, in oil.
Safety Worm Boom Hoist—Positive Swing Lock—Cab in any position.
Positive Propelling Lock—All controls from operator's seat.

Note—There are TEN Models of Bay City Shovels, sizes from ⅜ to 1¼ yd. sizes—but no better buy than Bay City "20." Get in line for yours—for profits!

Recent Quantity Purchases: N. Y. State Pub. Wks. Dept.—8; New Zealand Pub. Wks. Dept.—7

BAY CITY SHOVELS Inc. (Eastern Offices, Roselle, N. J.) BAY CITY, MICH.

An Experiment in Oil-Aggregate Mix

Michigan State Highway Dept. Used Mechanical Spreading on Low-Cost Project Near East Jordan

As part of its program of oil-aggregate road construction, an 11-mile contract near East Jordan, Mich., was completed late in 1935 for the Michigan State Highway Department. This road has a 20-foot wide oil-aggregate surface of 3-inch compressed thickness, laid on a new primed 21-foot gravel base. Sand and gravel aggregate for the mixture was produced by a portable gravel plant in a deposit near the project. A portable hot-mix asphalt plant was set up on a railroad siding nearby. This plant had one large drier and a one-ton pug mixer.

Use of Marl

A deposit of marl on high land with practically no overburden was found within a mile of the plant site. Since marl has a high moisture content, sometimes 50 per cent, the problem of drying presented itself. Ordinary drying methods cause it to cake and become lumpy. After being hauled to the plant site, it was piled over large diameter corrugated pipe with fires built inside. The marl was then fed into the drier with the aggregate. Passing through the drier it was pulverized and, when drying was completed, passed through the screen into the bin with the sand. In order to prevent the fines from being lost by the fan-induced draft, a dust collector gathered the fines from the exhaust and deposited them into the foot of the elevator at the discharge end of the drier. To provide the proper amount of 200-mesh material, the marl was fed on a separate elevator.

By trial, the number of buckets of marl for the full complement of aggregate buckets was determined. Frequent analyses by the inspector enabled him to check the amount of 200-mesh material present in the sand and to vary the amount of marl fed to give the desired result in the mixture.

The Mix

The aggregate was divided into two bins by a No. 6 mesh vibrating screen. Although the aggregates produced by the gravel plant were uniformly within specification limits, there was an occasional segregation in the stockpiles, but weighing the required amount of coarse and fine aggregate for each batch produced a uniform mixture with the same oil content. Frequent extractions of the mixture were made by the inspector to check the results.

With the type of drier on this hot-mix plant, it was found necessary to heat the aggregates to a temperature of 220 to 250 degrees F. in order to keep the moisture content below 1 per cent. Since there was usually about a 20-degree drop in temperature by the time the aggregate reached the mixture and with an oil temperature of 160 to 175 degrees, the resultant mix temperature usually ran between 180 and 225 degrees F. The maximum temperature at the time of mixing permitted by the specifications is 250 degrees F. While some of the oil volatiles are lost in mixing at the above temperatures, workability was not destroyed.

The mixing time was 10 seconds dry and 35 seconds after the oil was added. This mixing time under the conditions produced a thoroughly coated and black mixture.

Spreading and Compacting

To spread the material an Adnun mechanical spreader was used. These machines spread and strike-off the mixture up to 10-foot widths. The best results were obtained by spreading the mixture in two or more layers to provide a good riding surface. Rolling with an 8-ton tandem roller was deferred until late in the afternoon during the warm weather and sometimes until the following day, though when the weather was cool, rolling followed immediately behind the spreader. Straight rolling, once over, was found the best practice.

Light traffic was allowed to pass over the freshly laid material to assist compaction. During warm weather, traffic marked the surface for several days but light blading or dragging with a maintainer and additional rolling kept the surface in a smooth condition until the light crust was formed on the surface.

Scarifying and Reshaping

A considerable stretch of surface on this project was scarified and reshaped, using a large grader with a scarifier attachment pulled by a tractor. The surface was broken to a depth of about 1½ inches or about half the total surface depth. This was done during the latter part of October when the temperature was around 60 degrees F. on a stretch of surface that had been laid and under traffic for over a month. Since the teeth on the scarifier were about 4 inches apart and the comparative coolness of the air made the oil aggregate rather stiff, the mixture did not break up uniformly. A device made up of railroad spikes set 2 inches apart was attached to the front blades of the maintainer, which was pulled by a truck. This followed the large scarifier and broke up the surface uniformly to a depth of about 1½ inches.

The mixture so loosened followed through the blades of the maintainer and was struck off by the rear blades, leaving a smooth surface free from waves, due to the long wheel base of the maintainer. On part of this stretch new mixture was fed through the maintainer at the rate of about 50 tons to the mile to blend with the old. Rolling followed the reshaping. This outfit scarified and reshaped the surface at the rate of a mile a day at very low cost.

Gar Wood Opens New Shop For Road Machinery Div.

Last month Gar Wood Industries, Inc., opened a new building for the manufacture of Gar Wood road-building machinery. The rapid expansion of the business of this division, according to C. W. Wood, Highland Park Plant Manager, necessitated these larger manufacturing facilities. The new fireproof building has a concrete floor, 60 feet by 180 feet, and is fabricated of structural steel and brick. The front, side and rear wall areas are designed for glass to provide ample daylight within the building. In addition, the overhead lighting system produces a brilliant light, practically devoid of shadows. The plant is air-conditioned with the Gar Wood Tempered-Aire system.

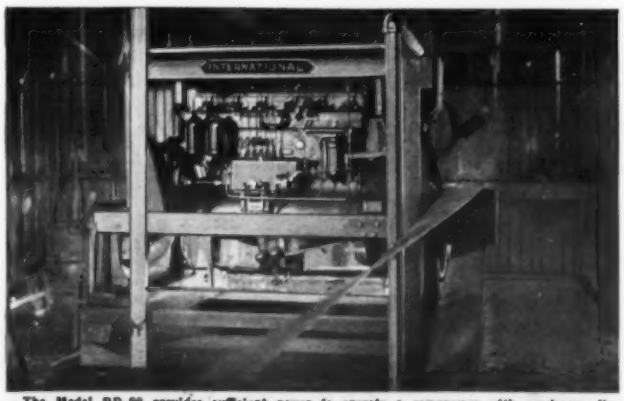
The New International PD-80 Power Unit —the Only 6-Cylinder Diesel That Can Be Cranked by Hand

● With the introduction of the new Model PD-80 Diesel Power Unit, the valuable features of International Harvester Diesel Engine design have become available to many new users of heavy-duty power. This big 6-cylinder engine, with its 4¾-in. bore and 6½-in. stroke, develops a maximum of 100 h. p. and delivers 80 h. p. under continuous load.

The new International PD-80 starts as a conventional gasoline engine and is as easy to crank as any gasoline engine of its size. After the engine has warmed up for two or three minutes the operator easily converts it to full Diesel operation by turning a conveniently placed crank one-quarter turn. Even in the coldest weather the engine parts are thoroughly warmed during this starting period, assuring full heat from compression to give a snappy Diesel start and efficient Diesel operation.

The new Model PD-80 is the latest addition to a line of power units ranging in size from 12 h. p. to more than 100 h. p.—backed by a nation-wide network of Company-owned branches and dealers. The International Industrial Power line also includes TracTracTors (crawlers) in three sizes and Wheel Tractors for all kinds of work. Check your power requirements with the nearest branch or industrial dealer.

INTERNATIONAL HARVESTER COMPANY
(Incorporated)
606 So. Michigan Ave. Chicago, Illinois



The Model PD-80 provides sufficient power to operate a compressor with maximum displacement of 500 cubic feet per minute when operating against 80 pounds gauge pressure—an example of the amount of work that can be done by this new International Diesel.

SPECIFICATIONS

International Model PD-80

Maximum Horsepower (corrected to sea level barometric pressure and 60° F—power unit fully equipped)	100
Horsepower, Continuous Load (80% of maximum horsepower)	80
Number of Cylinders	6
Bore and Stroke, inches	4¾ x 6½
R. P. M.	1400
Clutch Diameter, inches	15
Clutch Torque, pound feet	785
Flywheel Housing	S. A. E. No. 1
Fuel Used	Diesel Fuel
*Belt Pulley Diameter, inches	12
*Belt Pulley Face, inches	13
*Belt Speed, feet per minute	4398
Overall Length, inches (including starting crank but not belt pulley)	98¼
Overall Width, inches (24-inch turning radius of starting crank not included)	41
Overall Height on welded steel base, inches	66¼
Approximate Weight, fully equipped including welded steel base, pounds	3750

*Belt pulley is special equipment—other sizes available.

INTERNATIONAL HARVESTER

Careful Records Kept By Marion County, Ind.

(Continued from page 17)

Also, a time report showing the man's name, what he did and the number of hours worked. From this sheet, the yard payroll is made. Also, a tractor report is turned in by district men showing amount of miles traveled in maintaining roads, and the gasoline and oil consumed by them for the month. From these reports one can determine what any one person did any day during the month.

When the firms file their claims, or invoices, for the material furnished, these all come to us to be O.K.'d before they are allowed by the county commissioners. These claims are all checked with the delivery tickets and if found to be correct are O.K.'d by the supervisor. Then, opposite the entry of the requisition in the ledger, the date is stamped showing the date the claim was filed for approval of the county commissioners.

Often it is necessary to know how much gravel or cement was purchased from a certain company and by looking in the ledger, this information is immediately available. If you depend upon your county auditor for this you will probably be disappointed as your county auditor only posts his books by voucher number and amount, so you will have to look up several claims before you get the information you are seeking.

The efficiency of the county road department depends to a great extent on keeping these records that are so necessary, and in order to do this it is very essential to have adequate, competent clerical help, as well as an orderly system of record keeping.

From a paper presented at the Twenty-Second Annual Purdue Road School.

New Series of Bulletins On Soils and Drainage

As part of its program for the construction of low-cost secondary roads, the Illinois Division of Highways had completed on January 1, 1936, a total of 309.65 miles of stabilized gravel and crushed stone surfaces. An additional 55.71 miles was placed under contract for construction during 1936, this mileage being confined largely to locations where materials could be obtained locally. Of the mileage built prior to 1936, 15.65 miles were further improved with a bituminous surface of some sort and the 1936 program included the placing of 86.77 miles of bituminous surfaces on stabilized bases.

To make the routine tests in connection with this work, a soil laboratory was established by the Bureau of Materials of the Illinois Division of Highways at Springfield and branch laboratories in the various district headquarters. These laboratories not only perform work connected with the construction of stabilized surfaces but also general soils work, such as the treatment of subgrades, analysis of embankment materials, and the study of drainage problems.

A series of bulletins on soils and drainage work are being issued by the Bureau of Materials for field engineers engaged in this work, to acquaint them with the properties of soils and the latest development in soils work. The bulletins issued to date cover the following subjects: 1. Announcement and outline of subjects to be discussed in ensuing bulletins; 2. Correction tables for the hydrometer analysis; 3. Soil, soil forming processes, geological classifications, soil materials, chemical composition, color of soils, organic matter of soils; 4. Texture, mechanical analysis, textural grouping; 5. Characteristics of soil separates; 6. Classification of field tests, classification chart; 7. Structure, structural classification, granulation, structural terms; 8. Specific gravity and actual weight of soils.

Highway Lighting Shows Up Objects for 1,000 Feet

Safe night driving, with automobiles and pedestrians clearly visible on the highway more than 1,000 feet ahead, was demonstrated recently at the Salem Four Corners, near Salem, Conn., where eight 400-watt Westinghouse mercury vapor lamps have been installed. This demonstration was designed to serve as a complete laboratory of highway practice, including the slowing up of traffic and pointing out to motorists at night that a dangerous intersection is just ahead.

These eight Westinghouse lamps of 16,000 lumens are mounted 35 feet in the air and provide an even illumination over all the approaches to the traffic circle. This permits the driver to see every detail of the roadway at a distance of 1,000 feet ahead, according to the Westinghouse engineers. The bluish white light resembles full moonlight, although it is thirty or more times as strong. The intersection signs stand out sharply against the foliage and the green leaves and shrubbery are intensified by the light rays from the mercury lamps.

The construction of these luminaires is so designed as to redirect the light from the lamp to the roadway by Alzak processed reflectors. When first turned on, the high-intensity mercury lamp glows with a bluish green light and as the mercury vapor temperature increases, the light becomes more intense and assumes a bluish white color.

The most important of the several major Egyptian construction projects now underway, according to a report from the U. S. Bureau of Foreign and Domestic Commerce, is the so-called Saptich tunnel which will join two parts of Cairo now connected by a bridge. This tunnel will be about ⅝ mile in length and 30 meters wide and and will be dug under railroad yards at a cost of about 400,000 pounds Egyptian. It is on the arterial highway to Upper Egypt.

THE TOOL TO FIT THE

WHICH TYPE FITS YOUR JOB?... MISTAKES ARE COSTLY

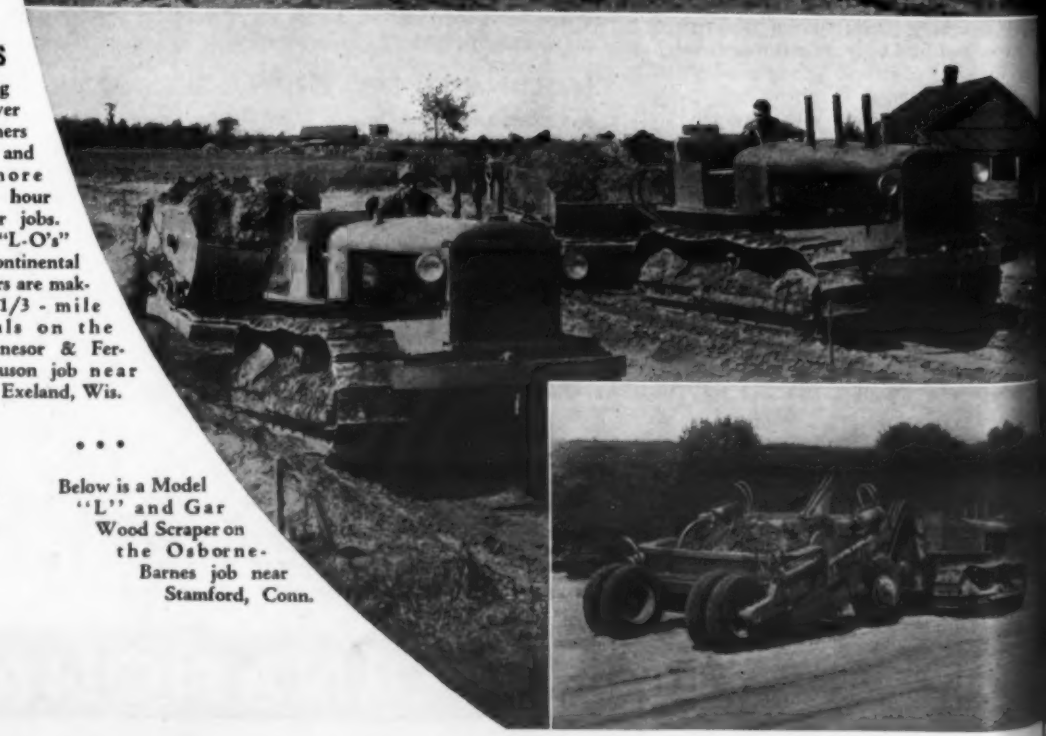
The "best way" to handle one dirt moving job may be fa from best on another—that is why it is so important to selec "the tool to fit the job." Before you make a decision that migh mean the difference between success and failure—check with th man who is best suited to give you an unbiased recommendation This man is the Allis-Chalmers representative. The fact that h has a COMPLETE line—adapted to ALL types of dirt moving work—enables him to make his recommendation honestly and without prejudice. Your A-C representative is more than a sales man—he is schooled to help you select the proper outfit for the job

SHORT HAULS

When it's an elevating grader job, here's the winning combination—a Model "L" or "L-O" on the grader and "K's" or "K-O's" on the wagons. This is the J. A. Carlson job near Malvern, Ia.

MEDIUM HAULS

The fast-stepping easy-to-maneuver Allis - Chalmers tractor digs and carries more loads per hour on scraper jobs. These "L-O's" and Continental Scrapers are making 1/3 - mile hauls on the Genesor & Ferguson job near Exeland, Wis.



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Below is a Model "L" and Gar Wood Scraper on the Osborne-Barnes job near Stamford, Conn.

Electric Welding Machine Standards Published

The National Electrical Manufacturers Assn. has recently released its publication No. 36-37, "Electric Arc-Welding Machine Standards" which is a reference work of practical information concerning the manufacture, test and performance of direct-current and alternating-current arc-welding machines, such as motor-generator sets, dynamotors, transformers and rectifier arc-welding units.

The book contains the standards for each type of arc-welding machine, definition of duty and service classifications, rating, performance and test, welds and welding, current and voltage, and also contains a list of the standard publications of the National Electrical Manufacturers Association. This publication may be secured from the National Electrical Manufacturers Assn., 155 E. 44th St., New York City, for 50 cents.

Barabe Made Sales Manager of Equipment Distributor

C. A. Barabe of Rockford, Ill., has been appointed Sales Manager of the Road Machinery Department of the Tractor & Equipment Co., 433 So. Jefferson St., Chicago, Ill. This company is Illinois distributor for International Harvestor TracTracTors and many allied lines of machinery in the construction and road building field.

Mr. Barabe has for some time been the representative of J. D. Adams Co. in northern Illinois and previous to that time was employed by the State Highway Departments of Indian and Illinois respectively.

Chain Belt Portland Office Moves to New Location

The Portland, Oregon, office of the Chain Belt Co., of Milwaukee, Wis., manufacturer of concrete mixers, elevators and conveyors, sanitation and construction equipment, has been moved from 215 S. W. 1st Avenue to 112-118 S. W. 1st Avenue. This move was made in order to carry larger stocks and offer better service to the territory.

BULLDOZING

Operators call the "K" and "K-O" the sweetest pair of bulldozing tractors ever to level a grade. This "WK" is on the Connell & Laub job near Marquard Mills, O.

BLADE WORK

Topped by the big Power Controlled No. 14 Grader with the exclusive Leaning Frame feature, the A-C grader line is designed "to fit the job." This all A-C outfit — Model "L-O," No. 12 Grader and No. 54 Speed Patrol — are owned by Chaves County, N. M.

LONG HAULS

Where hauls are long, and high traveling speed important, the Speed Ace hauling unit is "the tool for the job." George W. Condon has 11 Speed Aces on this job at the Casper-Alcova Dam in Wyoming.

MAINTENANCE

Whether the work is straight maintenance, oil mix, ditch work, or what not— Allis-Chalmers has a patrol to fit. Single or tandem drive. Two sizes, Gasoline or Diesel fuel oil. This is the Esty Paving Co. job, Cameron, S. C.

LLIS-CHALMERS
TRACTOR DIVISION—MILWAUKEE, U.S.A.
Controlled Ignition
OIL TRACTORS

Engineer Recalls Mexican Experience

(Continued from page 14)

simple enough, one cofferdam was closed with difficulty and later had a "blow" through the bottom, with no casualties fortunately. Everything else went along as smooth as clockwork. Even a brief stone mason's strike did not delay the work unduly, and the men were quite well behaved.

The laborers were tough sturdy little men. On one occasion when we were pouring a concrete seal for the second pier, two hundred men worked 20 hours with relief only for meals. Deficient in machinery, the men would work happily and enthusiastically in wheelbarrow crews handling aggregate and cement for the two big mixers which worked simultaneously.

Three hundred men were on the rolls at the camp which they called "Pujol," but a sizable proportion was sick all the time. We lost some men due to malaria, others perhaps from bad water. The local native laborers were pleasant to work with, but the mixed-blooded mechanics, carpenters and masons had to be brought for miles to work on the job, and they were the first to complain of the water, heat, etc.; also they were the ones who got into the brawls and not the Indians.

While swimming one afternoon I chanced to step on the putrifying flesh of a dead horse which had been thrown in the river which served, along with the vultures, as the disposal system of the district. I immediately designed a charcoal, sand and crushed stone water filter of concrete, and had the water boys use it instead of the river water which was used previously. No means were available for chlorination.

The Huastecan Indian is an entirely different man from the Otomi of the Sierra Madre Mountains. They were happier, more carefree and talkative; most of them did not carry knives, and when sober were a very mild and peaceful people. Only about 20 per cent of the Huastecan Indian tribe have not intermarried with the Spanish and the Huastecan language is almost extinct.

The Otomis and a few Huastecans are the only pure blooded Indians with whom I've worked. The mixed bloods from Michuacan Puebla and Guerrero have lost almost all of their former tribal identity.

Inter-American Highway

Work was begun on the Inter-American Highway in 1925, just about eleven years from its date of completion on July 1st, 1936. Every bridge is in and there are no detours, and latest official reports indicate that every foot is paved and patrolled by traffic officers, motorcycle-mounted and in uniform.

The highway from the border at Laredo, Texas, to Mexico City, is 763 miles in length. In round numbers, the road has a paved asphalt surface of oil penetration macadam and blotter treatment, 20 feet wide and, except for the mountainous sections, the roadway is 33 feet from shoulder to shoulder. The asphalt surface of the road is smooth and solid; the shoulders are firm and the ditches are well maintained. While there are no guard rails, there are large stones painted white on the outside of every dangerous curve, marking the shoulder.

The highway is located roughly between the old Missouri Pacific Railroad (Mexican National R.R.) and the East coast. It is so located as to open up almost virgin territory and to augment rather than to supplant the railroad facilities. The highway is one of which any nation might justly be proud; and as a tourist route it is ideal, inasmuch as the mountainous sections present exquisitely beautiful views of a grandeur different from anything in the States.

Ariz. Laboratory Tests For Road-Mix Aggregate

(Continued from page 1)

ter and 2 inches high, and loaded to approximately 2,000 pounds per square inch by any device capable of producing such a load. The material shall be loaded against a smooth face plate and the bottom sealed with paraffin. After sealing, the mold shall be immersed in water for 12 to 24 hours, and the swell measured.

"No material will be accepted that swells more than 1/16 of an inch, as measured from the top of the mold."

Other Tests

We are now satisfied that too literal a translation of this test is likely to give misleading results. It has been noted from time to time that materials do not swell, but the color does show a very definite tendency to fade. When this phenomenon occurs, we are skeptical of using the aggregate because it shows, in our opinion, a definite non-preference for oil on the part of the material under test.

It has been known for a long time that the phenomenon of adsorption applies equally well to road materials as to many other materials. We believe that fading from the original color of the oil-treated material under test is an indication that only fair or poor success may be had if that material is used.

Poor service results from materials which show fading with oil can be attributed to the ability of capillary water to cause a migration of the oil from its original place towards the surface. The usual result of this migration is an enrichening of the surface of the oil mix which causes corrugations, rutting, cracking and loss of non-skid properties in those mixes where a seal coat has been applied and covered with stone chips. The loss of non-skid properties is due to softening of the enriched surface with traffic forcing the chip seal into the softened mix, and its gradual displacement with oil.

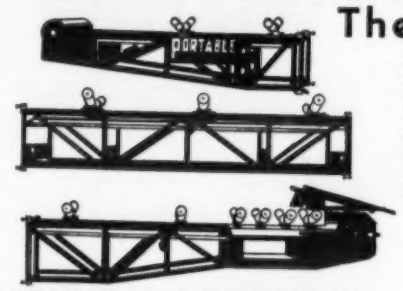
The object of any test procedure is to procure the best material. If certain materials behave similarly in practice, then it becomes mandatory on the part of the Materials Engineer to recognize those facts and to govern himself accordingly. Armed with the results of our tests, we now scrutinize all materials to be oil-processed very closely, selecting for use only those materials which exhibit neither the phenomenon of swell or fading.

Truck Operating Costs Easily Recorded in Books

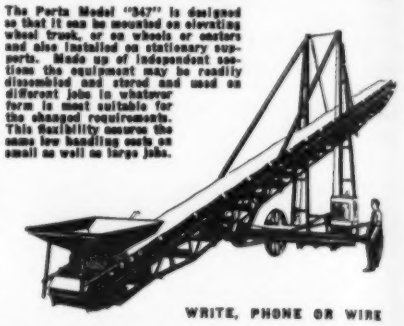
Altogether too many truck operators among contractors proceed without sufficient knowledge of the cost of operation and maintenance of their trucks. "They think they are making money when they have a balance in their checkbooks. Every operator should keep detailed accounts on every truck he runs, and should compare them constantly . . ." states E. D. Sirrine, Transportation Engineer, The Autocar Co., Ardmore, Pa., in a recent interview.

Growing consciousness of this condition by truck operators is evidenced in the demand for over 3,000 Cost Schedules, an improved form of truck accounting which The Autocar Co. supplies gratis to those interested. Simplified so that precise data can be kept by any clerk, these books have had a greater demand during the past year than in any previous year. Among the items which this analysis takes into consideration are: miles traveled, truck units involved, depreciation, interest, housing, insurance, taxes, wages, gasoline, oil, garage labor, repair parts and labor, tires, painting and washing, and garage supplies. Readers of CONTRACTORS AND ENGINEERS MONTHLY who have not secured copies of these Cost Schedules may do so by writing direct to The Autocar Co. at Ardmore and mentioning this magazine.

Handle Concrete and Aggregates The Economical Way



The Parts Model "347" is designed so that it can be mounted on elevating wheel truck, or on wheels or castors and also installed on stationary supports. Made up of independent sections the equipment may be readily disassembled and stored and used on different jobs in whatever form is most suitable for the changed requirements. This flexibility assures the same low handling costs on small as well as large jobs.



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PURPLE STRAND Form-Set

SOME fellow once said "You get what you pay for." A good phrase but not always true except when buying Williamsport Wire Rope.

The Telfax System of grade marking, exclusive with Williamsport, has been a "God-send" to users who have heretofore had extreme difficulty in checking the quality of steel used in various grades of ropes of other makes.

To those whose operations can use *pre*-formed Wire Rope we offer our Purple Strand "Form-Set" with full confidence that the extra service it will render makes its use one of great merit and outstanding economy.

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Conducting Business For Tax Advantage

By WILLIAM H. CROW,
Tax Attorney and Co-author of "Planning for Tax Economy"

IN the first article of this series, which appeared in the November issue of CONTRACTORS AND ENGINEERS MONTHLY, the advantages to taxpayers in the heavy construction industry in anticipating, weighing and planning their organizations with respect to tax consequences were discussed.

At the risk of seeming to overstress the point, the time to give consideration to tax effects is prior to the determination of tax obligations and not after these obligations have become fixed. This of course calls for thorough familiarity with the provisions of the federal and state statutes and the regulations thereunder, and a careful study of their applicability to future programs. The tax advantage must be definitely kept in mind as an important element in management, and therefore should be the responsibility of the major executives rather than delegated to a clerk as mere routine.

Review vs. Forecast

The process of planning for tax effects under Title IX of the Social Security Act, relating to unemployment insurance, and the corresponding payroll tax laws in the various states will naturally be different in character from planning for tax consequences under Title VIII of the Social Security Act, relating to the Federal Old Age Benefits System. This is primarily due to the fact that the former impositions have been in effect during the calendar year 1936, whereas the exactions under Title VIII will go into effect January 1, 1937. To appraise the tax position under Title IX, therefore, calls for what may be termed a "tax audit." In other words, the inquiry should be whether the affairs of the established taxpayer as now conducted, which is the result of decisions of the past, have been soundly formulated from the standpoint of tax obligations, and if not, what changes should be made. On the other hand, the point of view with respect to Title VIII relates entirely to the future. The problem is how to arrange the affairs of the contractor taxpayer so that he will achieve the result of maximum tax economy during the taxable period of 1937 and thereafter.

Exemption or Diminution

Approaching the problem of tax savings under these federal and state laws, attention will naturally be directed toward two classes of circumstances: first, employment by the contractor of a sufficient number of individuals to make him subject to the tax, and, second, conduct of employment in such

Number of Employees, Where Working and How Paid Determines Amount of Payroll Taxes

a manner as to subject him to minimum tax on total wages payable during the calendar year.

In respect to the first of these considerations, Title VIII, relating to old age benefits, differs from Title IX, relating to unemployment insurance, in that the former is applicable to all cases where there is one employee, whereas the federal act, Title IX, specifies a minimum of eight. State payroll tax laws have varying minimums, from one in the District of Columbia, four in New York, New Hampshire, Oregon, Utah and Washington to eight in Alabama, California, Massachusetts and Wisconsin.

Under Title IX a person is an employer who employs eight or more individuals on each of some twenty days during a calendar year, each day being in a different calendar week. Even if an employer is not subject to any state unemployment insurance law he is nevertheless subject to the tax. However, if he is subject to such a state law he is entitled to credit against the tax any contributions with respect to employment paid by him during the taxable year to an amount not to exceed 90 per cent of the tax against which it is credited. Such credit is to be allowed only for contributions made under the laws of states certified for the taxable year, as provided in Sec. 903, Title IX of the Act.

The several weeks in which there occurs a day on which eight or more individuals are employed need not be consecutive weeks. It is not necessary that the individuals so employed be the same individuals. They may be different individuals on each such calendar day. Neither is it necessary that the eight or more individuals be employed at the same time or for any particular length of time or on any particular basis of compensation. Under Title VIII of the Federal Social Security Act all employers, regardless of the number of their employees, are subject to the excise (payroll) tax imposed by this title, unless specifically exempted thereunder. The number of individuals employed by the employer and the period during which any individual is employed is immaterial.

Exception of Casual Services

Under the excepted services under Title VIII is casual labor not in the course of the employer's trade or business. The term "casual labor" includes labor which is occasional, incidental or irregular. The expression, "not in the course of the employer's trade or business," includes labor that does not promote or advance the trade or business

(Continued on page 29)

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Air operated vibrators for all classes of concrete construction including bridge deck slabs, dams and locks.

Portable Vibrating Screed Boards for highway pavements.

Special steam operated vibrators for placing hot asphalt mixtures.

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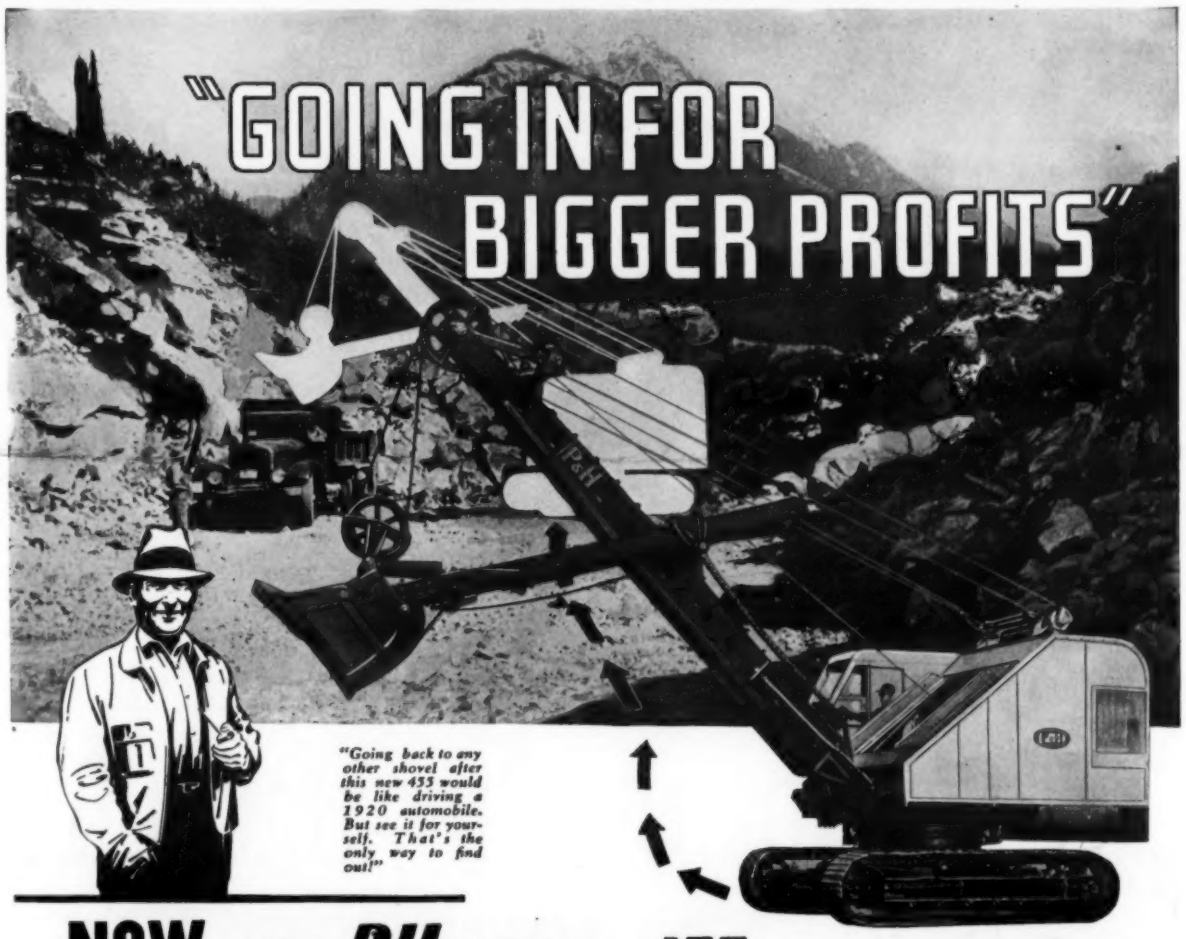
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"Going back to any other shovel after this new 455 would be like driving a 1920 automobile. But see it for yourself. That's the only way to find out!"

NOW THE P&H MODEL 455 STEPS AHEAD IN THE 1-YD. CLASS

Any production-minded contractor who sees the new 455 in action knows what's happening in the excavator business. The days of hulky cast machinery are numbered! Now it's speed—speed in getting to the job—in getting through with it and on to the next job. It's the ability to earn faster. The new 455 has it!

THE ONLY 1-YD. MACHINE WITH ALL THESE NEW HIGH PRODUCTION FEATURES

1. *Greatly improved traction.* The first time on a 1-yard machine—tractor-type crawlers with compensating springs and tough rolled steel shoes.
2. *Huskier frame of alloy steel, all welded.* Lighter, far stronger; cross-braced with rolled steels of uniform strength to minimize tendency to "weave".
3. *Smoother action with helical cut gears.* 100% helical gearing in the hoist mechanism; three teeth enmesh at all times. Fully enclosed in oil bath.
4. *Faster swing on a live roller circle.* Fast, full-loaded swings are safe on this huge roller bearing. Six hook rollers relieve center pin of all strain.

Then, remember—in this new 455, there's huskier Diesel power—live boom that adjusts to any working angle—split-second power clutches—two speed transmission for every movement—automotive-type foot pedals and lightly manipulated levers; so simple to run that any operator at the controls of this new Pacemaker becomes a star operator. Prove it to yourself!

A penny postcard is all it takes to bring your copy of this new bulletin X-11. Send for it today.

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P&H PACEMAKERS—FASTER ON THE JOB

Minnesota Prepares For Battle with Snow

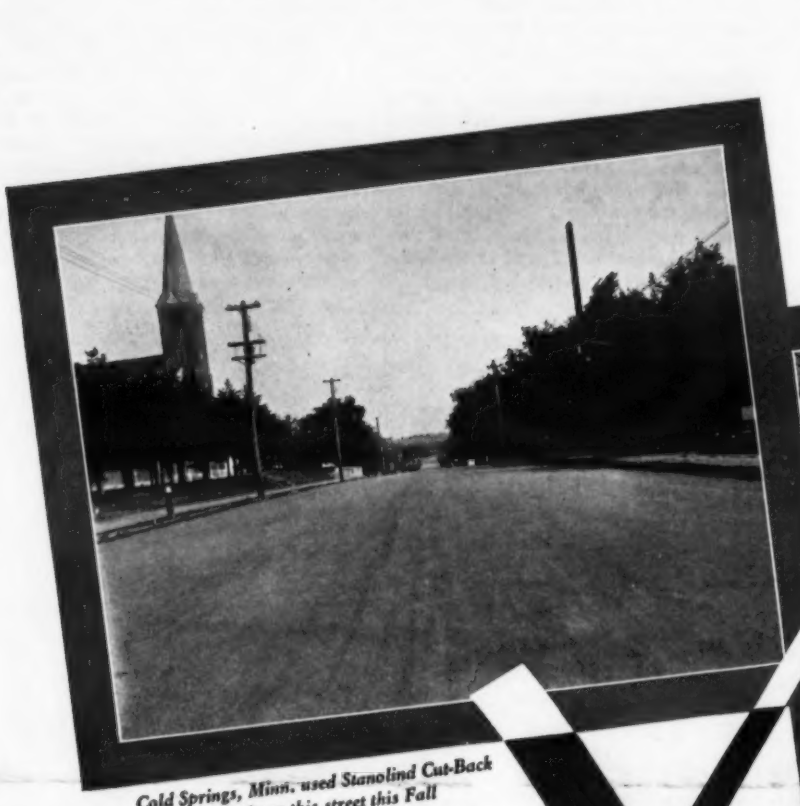
Approximately 450 snow plows are ready for the annual task of keeping Minnesota trunk highways open to winter traffic, according to N. W. Elsberg, State Highway Commissioner. These plows are distributed among the sixteen state highway maintenance districts and include 114 power graders used in slush and light snow; 95 one-way plows which throw the snow to one side of the road only; 245 big V-type plows which throw snow to both sides and can cope with heavy snows and drifts; 12 truck-mounted rotary plows for extremely deep drifts.

The big V plows weigh more than a ton each, and are attached to 3 to 5-ton trucks. In severe storms two such trucks work coupled together in tandem while bucking drifts. During the past year, a number of 3-ton trucks which had worn out were replaced by 4 and 5-ton units to provide greater power for battling snow on the 11,340 miles of trunk highways.

As a preventive measure, the highway department has erected more than 1,000 miles of snow fence at locations where drifting occurs every winter. To combat the danger of ice-coated roads, the department has placed 10,000 cubic yards of gravel and 100 tons of calcium chloride in stockpiles at strategic locations.

Last winter snow storms cost the highway department more than $1,000,000 in maintenance expense.

Construction enterprises took 47,149,945 pounds of explosives during the first six months of this year, or 9,980,334 pounds in excess of last year, reports the Bulletin of the Institute of Makers of Explosives. California, as in 1935, leads all states in the consumption of explosives for this purpose, employing 8,137,185 pounds.



Cold Springs, Minn. used Stanolind Cut-Back Asphalt on this street this Fall

Another street in Cold Springs, Minn., paved with Stanolind Cut-Back Asphalt

Check these Advantages of STANOLIND CUT-BACK ASPHALTS

AND SEE HOW THIS IDEAL PAVING MATERIAL FITS YOUR NEEDS!

- ✓ Furnished in 5 grades to provide proper fluidity for different types of construction.
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Stanolind Cut-Back Asphalt has been used for the busiest streets in the world. It is the ideal paving material for every traffic requirement, providing *extra safety values* in a non-skid and non-glaring surface. More miles of road in the Middle West have been paved with Cut-Back in the last decade than with any other material. Take advantage of the experience of Standard representatives in selecting materials and methods. Their help is free—yours for the asking. Just phone your local Standard Oil (Indiana) office or write to

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IN LONG-WEARING ROAD MILES . . . *IN* DISTRIBUTION OF LABOR . . . *IN* TAXPAYER SATISFACTION

Explosives Used To Settle Fill

(Continued from page 13)

cules Extra Gelatin were attached. These torpedoes were pushed into the soupy mud in front of the fill at intervals of 8 to 10 feet and all of the torpedoes detonated at one time. This method gave very good results where the mud was so heavy that the fill would not sink from its own weight.

In the sections where the railroad was close, the fill was brought to grade first next to the railroad and only half the total width, or 45 feet, was filled. Then the first borings on the fill were made in this section to determine the proper weight of overburden to be placed for a successful deep-hole acceleration shot. The overburden was placed on the fill to a height two-thirds the depth of mud left under the fill, or 8 feet of overburden would be placed on a fill with 12 feet of mud left under it. As an exception to this general rule, it was found that on shallow fills the overburden must be greater than the depth of mud left in place. Fills up to 15 feet were considered shallow and those over 15 feet were considered deep fills on this project.

It was also learned that the weight of the material in the fills had a marked effect both on the rate of settlement and the proper charge for underfill shooting. Therefore the type of material used in the fills was closely watched and a table was drawn up, showing the explosives charge required to accelerate settlement of different types of material. In making the table, it was assumed that the action of the explosives took the form of a cone with a 60-degree angle at the apex.

It was also assumed that best results were obtained by heaving the fill, with its overburden, not more than 6 to 8 feet. This assumption was proved correct by experiments which were made heaving the fill as much as 20 feet. But acceleration was not obtained from the 20-foot heave. Instead, the mud came up through the fill and left the fill higher than before. Also, the shot stirred up the bottom so that subsequent soundings gave results that looked like a nightmare.

In the 45-foot section of fill next to the railroad, 850 pounds of 40 per cent Hercules Extra Gelatin was the maximum shot fired. In the other 45-foot sections, and in the 90-foot sections that were not near the railroad, the charges to accelerate fill were not limited, and individual shots ranged from 1,000 to 5,300 pounds of 40 per cent Extra Gelatin.

After the fill was made, borings were taken and cross sections were plotted, showing the position of the fill with reference to mud and hard bottom. From such sections, the charges were computed and the holes spaced. On the 90-foot section, for example, holes were placed 20 feet apart, starting at the center line, with a total of 9 holes. The next line of holes was placed 20 feet beyond. Four lines of holes usually made a shot, but more were included when feasible.

Fill-Acceleration Machine

The same machine was used for drilling holes, making soundings and taking borings, and is known as the Maryland Fill-Acceleration machine. With it the loading pipe, which is 1½-inch pipe with extra-heavy couplings, was driven through the fill where the position of the holes had been marked. The pipe was closed at the lower end by a wooden plug. About 7,000 of these plugs were used.

Stakes were stuck in the ground by the engineer at each hole, showing the exact depth to which the pipe was to be driven. When the pipe was driven to its proper depth, a rod was run through the pipe and the plug knocked out. A tin tube containing two 1¼ x 8-inch cartridges of 40 per cent Hercules Extra Gelatin and the electric blasting cap was placed at the bottom of the pipe. The pipe was withdrawn 18 inches to be clear of the explosion and the charge was fired, springing the hole. It was found advisable to spring all holes in the cross section at one time; first, because mud will congeal and close in; second, because the hole must be loaded shortly after being sprung or it will fill with sand; and third, because a premature explosion by propagation may occur from the next hole if a main charge is placed before the adjacent hole is sprung.

Main Charges

After the holes were sprung, they were immediately filled with water to expel gas, to keep the mud soft, to act as a cushion for the main dynamite charge, and to prevent sparking of gravel on the loading pipe. After the hole was filled with water a red flag and the exact amount of dynamite for the main charge were put beside the pipe. When the hole was loaded, the red flag was stuck in the top of the pipe.

The main charge was loaded by pushing five sticks to the center of the sprung chamber. If the five sticks loaded easily, the load was increased to 8 or 10 sticks at a time until the total charge was loaded. Often, during loading, sand would come up the loading pipe so that the dynamite could not be forced down. When this occurred a wad was made from the wax paper or liner of the dynamite case and run through the load-

(Continued on page 31)

BARGAINS in Construction Equipment

The directors of the Middle Rio Grande Conservancy District have authorized us to offer the last of their construction equipment, made available by completion of the construction work, at bargain prices. This equipment is all in good condition and includes

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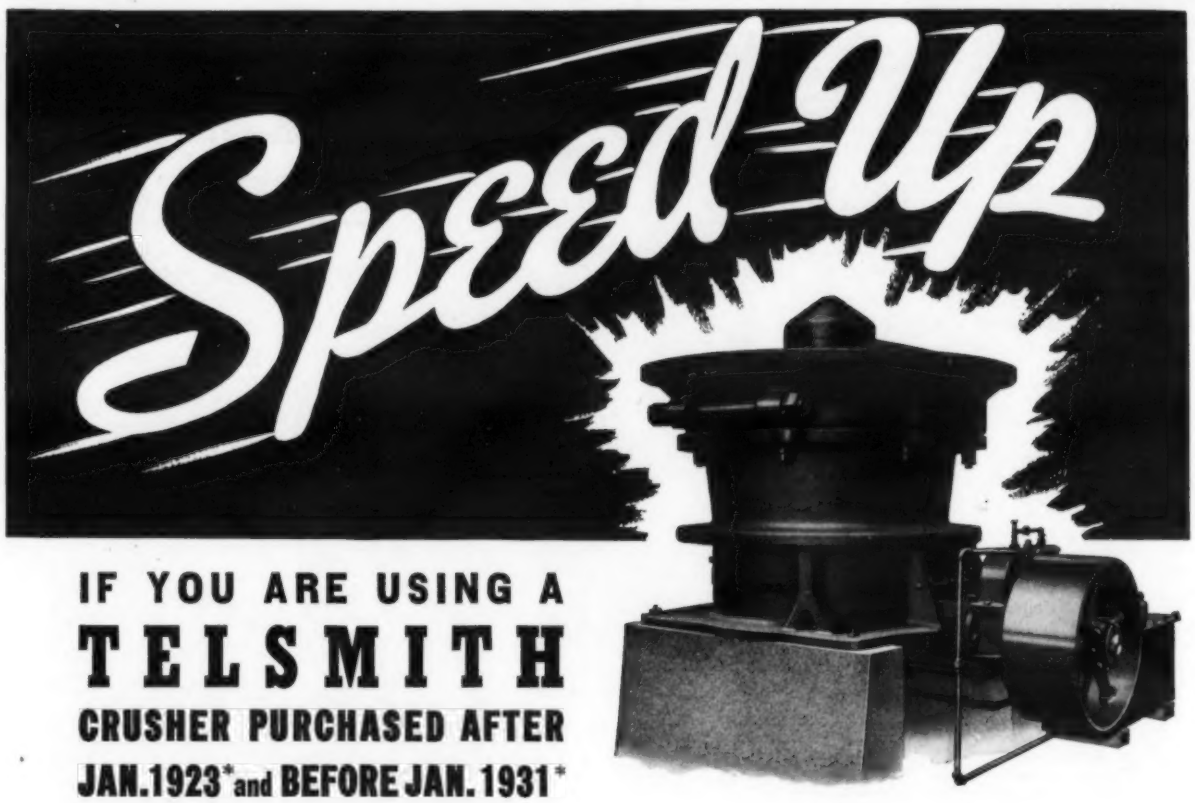

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*In Jan. 1923 Telsmith adopted steel construction. In Jan. 1931 Telsmith current high-speed models were announced.

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TELSMITH CRUSHERS

Avoid Legal Pitfalls

These brief abstracts of court decisions may aid you. Local ordinances or state laws may alter conditions in your community. If in doubt consult your own attorney.

Edited by A. L. H. STREET, Attorney-at-Law.

Checks "In Full"

"Here is our check as final payment for all sand and gravel you furnished on that Kentucky bridge job," said a contractor to a material company.

"But," protested the material company, "there is more due us than that."

"We have deducted to cover 700 yards of sand and gravel that was rejected by the bridge authorities," replied the contractor.

Then ensued a controversy as to whether or not contractor owed the material company anything on account of the rejected material. Finally, the company cashed the check, but later sued to recover on account of the 700 yards.

The material company's attorneys evidently thought that the case fell within the well established rule of law that where one owes another a definite sum of money and tenders a payment of less as being in full, acceptance of the payment will not prevent the creditor from suing for the balance. The theory of the law is that in such case there is no consideration for the creditor's implied agreement to accept the smaller sum as full payment.

But the Iowa Supreme Court decided (Koch Sand & Gravel Co. v. Koss Construction Co., 260 N. W. 54) that the case was governed by the legal rule that where a bona fide dispute exists between creditor and debtor as to the amount actually due, the creditor's acceptance of a sum tendered by the debtor in full settlement so sews the creditor up that he cannot later come back and ask for more money.

Obligation to Install Materials Before Payment

"For $1,100," said a tile company to a general contractor, "we will *furnish and install* tile flooring. Title to the tile shall remain in us until paid for, and you are to furnish us with a room for storage of the materials. On our request, you are to pay us 80 per cent of the contract value of the material and/or labor *furnished*; balance on completion."

The title company shipped tile and cement to the job and payment of 80 per cent of its value was requested.

"Aren't you a bit premature?" asked the general contractor. "You haven't *installed* any tile yet."

A deadlocked controversy ensued, resulting in removal of the materials. Presumably some one else furnished the flooring.

Four of seven judges of the Pennsylvania Supreme Court decided (David E. Kennedy, Inc., v. Charles S. Bannett, Inc., 163 Atl. 372) that no payment had become due under the subcontract, because there had been no installation. Stress was laid by the majority of the court on the point that the tile company worded the contract. If it was desired to insist upon payment before installation, that company should have clearly worded the contract to that effect. The majority opinion follows this reasoning of the trial court: "We do not think there was any more furnishing of material to the defendant in this case than if the material had still remained in the plaintiff's own factory, or had been placed in a warehouse, or anywhere else, since the defendant was not allowed to gain any access to it until it met the plaintiff's preliminary demand of payment."

Tardy Claim Denied

"Speak now or forever hold your peace!" So silently declares the Law in many matters pertaining to construction contracts. A little more specifically, another applicable adage is that "he who fails to speak when he should may not do so when he would."

A subcontractor received pay checks for his services as the work progressed. After the job was over he insisted upon being paid for extra services claimed to have been performed on Sunday.

Apparently, the general contractor made no contention that there could be no recovery on the ground that the Sunday work was illegal. He stood on the ground that the claim was too tardily made, not having been presented until after the contract was completed. Said the Michigan Supreme Court (Holmquist v. Sorenson, 257 N. W. 732):

"There was never any special agreement for such services. During the time that work was in progress, plaintiff was receiving his regular pay checks and never made any claim that the amount received each pay day was not correct. We think it now too late to make such a claim."

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Do not let low prices influence your judgment of quality—low prices are a sure indicator of low quality. Specify nothing but the best.

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Pumping Concrete For Dam No. 16

(Continued from page 1)

ered to the upper sections of the piers and to the operating houses, Archer Iron Works steel towers were erected. These acted as supports for the vertical pipe of the Pumpcrete and also to hold 2-yard hoppers in which concrete was stored when it could not be placed at the uniform rate at which it was delivered by the Pumpcrete. From the hoppers the concrete was delivered through semi-circular chutes to top hoppers mounted on the forms and then through elephant-trunk chutes to the bottom of the forms. One man was located at the tower hoppers to control the flow, and four men handled the semi-circular counterbalanced chutes to the form hoppers. A placing crew of twelve men working in the forms for the piers handled the elephant-trunk chute and spaded and "booted" the concrete. Two men each with a Vibrospade kept the 1½-inch slump concrete from becoming honeycombed.

Forms for Piers, Control Houses

The piers average 54 feet from the base to the floor of the operating machinery buildings. When pouring the piers the first lift in the Blaw-Knox steel forms was 15 feet, then the remainder were three 10-foot lifts for a total of five lifts including the first sill. The steel forms were tied with 1⅜-inch rods in pipe sleeves. The heaviest of the panels for the piers was 22 tons while the smallest was 8½ tons. These were handled by a Clyde-Wiley whirley with a 100-foot boom. The maximum size of the panels was determined by the weight that could be handled by the whirley.

Wood forms were used for the control building walls. These were built up of 1 x 8-inch shiplap lumber lined with ⅛-inch Masonite Prestwood. The studs were 3 x 6's and the wales 3 x 8's double with ⅝-inch tie rods held with National form clamps and cone nuts. No vibration was used for the concrete in the walls of the control houses except around the windows. Mall and Viber electric vibrators were used. A 5-inch slump concrete was used in the operating house walls with 6½ bags of cement per cubic yard of concrete.

Keeping the Hole Dry

During the early part of the concreting it was of the utmost importance that the hole be kept dry. The first unwatering was done with two Dayton-Dowd 12-inch vertical centrifugal pumps suspended from a frame over a sump in the center of the cofferdam. Then water was kept down and leakage reduced to a minimum by four Moretrench well-point pumps, all 8-inch, with 330 well-points of 2½ and 2-inch diameter. The Superintendent boasted that "this was the driest hole in the Mississippi."

The hole was not flooded out during the entire operation although the river rose to within 0.3-foot of pay stage. This placed a head of 30 feet on the cofferdam. During the summer of 1936 the river was at the lowest stage for many years, much to the delight of contractors working on locks and dams but to the consternation of the U. S. engineers who were responsible for the maintenance of the 6-foot channel depth for barge traffic.

Safety Measures

On all government construction considerable attention is paid to the safety measures which will prevent needless accidents to workmen. The U. S. Engineers had one employee who was responsible for the maintenance of the safety program on each of the Mississippi River contracts. When going over the Central Engineering Co. contract at Dam 16, the first impression was that if a man could read he should be impressed with the fact that he should look out for the pitfalls of carelessness and avoid accident. On the walk along the top of the Tainter gates the poles that carried the electric wires for overhead lighting each bore a clearly painted sign with the warnings: "Safety First"; "Be Careful"; "Watch Your Step." These were repeated all the way across the gate section.

"Get First Aid" signs with arrows pointing to the various first aid stations were prominent throughout the job.

Every ladder was carefully nailed to the forms it was serving and the stairways of a more permanent construction to be used for the duration of the work were securely built of 2 x 12-inch lumber with double timbers through the center sections, and the same material for the treads which were from 30 to 48 inches long, depending on the amount of traffic to be expected. All treads were well cleated with 2 x 4's.

Approach to the job was from the Muscatine side across the main tracks of the Milwaukee Road so the U. S. Engineers paid a flagman to be on duty at all times to flag cars across and prevent accidents at the grade crossing. C. S. Benedict was U. S. Safety Inspector.

C. & E. M. Photo

One of the Well-Placed Safety Signs

Personnel

The Central Engineering Co. of Davenport, Iowa, completed the construction of Lock 16 in 1935 and soon after was awarded the contract for the construction of the accompanying Dam 16 with the long spillway on the Iowa side. The work on both the Lock and the Dam was in charge of Art E. Cossens, Superintendent for the contractor. The work for the U. S. Engineer Corps was under the direction of the Rock Island District office, Lt. Col. E. E. Gesler, Acting District Engineer, with O. R. Ramser as Resident Engineer.

AED Annual Meeting

The Associated Equipment Distributors will hold their 1937 annual meeting on January 10, 11 and 12 at the Roosevelt Hotel in New Orleans. A very interesting program is being prepared by G. F. Lowe, of Chicago, Chairman of the Program Committee. J. S. Gilman of Minneapolis, President, will preside.

MOVING MOUNTAINS—Hercules Power follows the engineer around the world—moving mountains of dirt and rock, smoothing the path for traffic—in man's conquest of nature.

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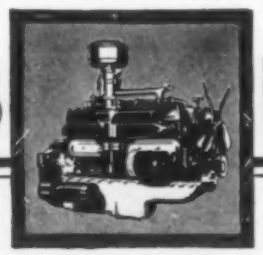
HERCULES  ENGINES

Three-Year Service of Brick Test Road

Carroll County Experiment in Ohio Shows Advantages and Faults of Different Features of Brick Pavement

(Photos on page 40)

SOME interesting facts have come to light after three years' traffic on an experimental brick road in Carroll County, Ohio, according to R. R. Litehiser, Chief Engineer, Bureau of Tests of the Ohio State Highway Department, who discussed this work before the Highway Research Board.

The road, located on State Route 43, starts at Carrollton and extends about 3 miles to the north. Four general types of construction were included in the project: monolithic; semi-monolithic; grout-filled on a granulated slag cushion; and bituminous-filled. Two other types of cushion were used, cement-sand and mastic. Alphabetical designations were given to the twenty-one sections and subsections.

Methods and Results

In constructing the monolithic subsections, D and D-1, a 1:2 and a 1:3 grout filler, respectively, was used on a 7-5-7-inch base of 1:7½ concrete, with expansion joints spaced 50, 75 and 100 feet apart. To insure proper alignment, the expansion joints were carried up through the brick surface. After three years of service, these monolithic subsections are in good condition. No difference has been noted in the two grout fillers or in the three spacings of the expansion joints.

The semi-monolithic sections B and E and a grout-filled section on a granulated slag base J were constructed on a 6-inch base of 1:7½ concrete with the expansion joints spaced 100 feet apart. Section B had a 1:6 cement-sand cushion, subsection B had a 1:3 grout filler and subsection B-1, a 1:2 grout filler.

There was nothing to indicate any difference between the two grout fillers. There were generally two transverse cracks in each 100 foot slab. In measuring the cracks, the width of the pavement was taken as the unit.

Subsection E had a 1:3 temperature-resisting cement and sand cushion with a 1:2 temperature-resisting cement grout filler and Subsection E-2, the same cushion and a 1:3 temperature-resisting cement grout filler. Tests showed no apparent difference in the condition of these two subsections. The transverse cracking was slightly less than in the other semi-monolithic sections.

Subsection J had a 1:3 grout filler and Subsection J-2, a 1:1:2 grout lime filler. In general, there were two transverse cracks in each 100-foot slab.

The transverse cracks in Sections B, E and J consisted generally of one comparatively large crack entirely across the base and surface and one or more cracks in the mortar bond only about midway in each 100-foot section.

Longitudinal cracking was controlled consistently by a tar paper center joint used in the semi-monolithic and grout filled sections except in Section E where embankment settlement developed.

All of the bituminous-filled sections were constructed on a 6-inch base of 1:7½ concrete with impressed contraction joints at 50-foot intervals. Several types of fillers and surface treatment were used with granulated slag and mastic cushions.

On sections A, C, F and I, a thin coating of filler was left on the brick surface and shot gravel, sand or chips was rolled in. At the time of inspection, the surface was from 10 to 50 per cent covered with the original coating of asphalt and the filler remaining on the pavement was still impregnated with grit.

A spray coat on sections G and H was used to facilitate the removal of the excess surface filler. While the surface was clean originally, the filler exuded considerably during the first year and at the time of the inspection it extended over the brick about a ½-inch on each side of the joint.

Conclusions

Mr. Litehiser states that all of the features in the monolithic type have given excellent service. The semi-monolithic and grout-filled sections have suffered to some extent because of poor alignment of the exuding type of expansion joint in the surface and base courses. Also the joint spacing of 100 feet has proved too great.

No expansion joints were used in the bituminous-filled sections. Slight cracks resulted immediately above in the surface at 50-foot intervals over the contraction joints in the base. The several cushions are all satisfactory.

No accidents have occurred on this experimental pavement from slippery surface conditions, except one which involved an icy surface.

Anyone desiring more detailed information about the location of the various sections, A, B, C, etc., may obtain it upon request from Mr. Litehiser. Signs on the roadside mark the sections.

SNOW REMOVAL ON DAM JOB

An Angledozer on a Caterpillar Diesel, Owned by the Utah Construction Co., of Ogden, Utah, Opening a Road Last Winter at Pineview Dam, Ogden Canyon, Utah

Handbook of Arc Welding Design and Practice

The new "Procedure Handbook of Arc Welding Design and Practice", now in its fourth edition, has recently been announced by the Lincoln Electric Co. New data presented in this Handbook includes 223 pages of information on the following subjects: characteristics of the welding generator, selection of type of joint, insurance of fusion welded vessels, welding codes, arc cutting, polarity of welding current, horizontal welds, sheet metal welding, effect of electrode size on welding cost, methods of testing weld metals, 4-6 chrome steel, monel metal, principles of surfacing by welding, welded designs begins with standard shapes and plates, and plate girders.

In addition to this entirely new data, this 819-page Handbook, with 990 numbered text illustrations, has been thoroughly revised in all its departments in the light of present-day developments. Concisely written and profusely illustrated, this book is designed as a complete reference guide for all interested in arc welding, including designers, engineers, contractors, and operators.

Copies of this handbook may be secured from the Lincoln Electric Co., Cleveland, Ohio. Price $1.50 postpaid in the United States; $2.00 elsewhere.

Road Contractor Changes To Diesels for Trucks

The first large order for diesel engines placed by a contractor operating dump trucks in the United States was recently executed by the B. Turecamo Contracting Co. of Brooklyn, N.Y., one of the outstanding contracting firms in the New York area, which does considerable road building in the lower New York territory. For many years this company has used diesel engines exclusively in its fleet of tow-boats which pull scows of gravel and crushed rock.

In the spring of 1936 they made the first installation of a diesel engine in one of their Mack dump trucks. So successful was the operation of this Cummins HB-4 engine that in October they placed an order with the Cummins Diesel Sales Corp., of New York, for eighteen additional engines of the same time. This order changes their fleet of Mack dump trucks completely to diesels.

These trucks are used on both long and short hauls from the contractor's Marine Terminal at the foot of 24th Avenue, Brooklyn, N. Y., which seems to set at rest the prevalent belief that diesels are suitable only for long haul operation.

Remember the dates of the ARBA Convention to be held in New Orleans on January 11-15, 1937.

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Meeting Problems of Payroll Taxes

(Continued from page 23)

of the employer.

If A operates a sawmill and employs B, a painter, at a daily wage to paint his home, B's labor is casual and is not in the course of A's business of operating a sawmill. If, however, A had employed B for two hours at an hourly wage to remove sawdust from his mill, B's labor is casual, since it is occasional, incidental or irregular, but it is in the course of A's trade or business and therefore is not excepted.

Contractor and Subcontractor

In determining whether a contractor has a minimum number of employees to subject him to the provisions of Title IX, or the number of employees on whose wages his tax is based under any of the federal or state statutes, arrangements with subcontractors may be important.

Under Title IX an individual is in the employ of another within the meaning of the Act if he performs services in an employment within the United States not excepted by the Act. However, the relationship between the individual who performs such services and the person for whom such services are rendered must be the legal relationship of employer and employee. Whether the relationship of employer and employee exists will in doubtful cases be determined upon an examination of the facts of each case.

If a contractor endeavors to evade the tax by a sham arrangement whereby persons actually working for him are made to appear as employees of a subcontractor, such an evasion will not be permitted. Where, however, a contractor enters into bona fide subcontracts, he may not within the provisions of the Act be considered an employer of the persons working for the subcontractor.

Generally, the relationship of employer and employee exists when the person for whom services are performed has the right to control and direct the individual who performs the services, not only as to the result to be accomplished by the work, but also as to the details and means by which that result is accomplished. In this connection, it is not necessary that the employer actually direct or control the manner in which the services are performed. It is sufficient if he has the right to do so. The right to discharge is also an important factor indicating that the person possessing that right is an employer. Other factors characteristic of an employer are the furnishing of tools and the place to work to the individual who performs the services. In general, if an individual is subject to the control or direction of another merely as to the result to be accomplished by the work, and not as to the means and methods for accomplishing the results, he is an independent contractor, not an employee.

If the relationship of employer and employee exists, the designation of the relationship by the parties as anything other than that of employer and employee is immaterial. Thus, if two individuals in fact stand in the relation of employer and employee to each other, it is of no consequence that the employee is designated as a partner or co-adventurer, agent or independent contractor.

Measurement, method or designation of compensation is also immaterial if the relationship of employer and employee in fact exists.

Approved Written Agreement With Subcontractors

The New York Unemployment Insurance Law defines employer to mean " any person . . . . who, or whose agent or predecessor in interest, has employed at least four persons in any employment subject to the statute within each of thirteen or more calendar weeks in the year 1935 or any subsequent calendar year." The statute further provides "in determining whether an employer employs enough persons to be an employer subject hereto, and in determining for what contributions he is liable hereunder, he shall, whenever he contracts with any subcontractor for any work which is part of his usual trade, occupation, profession or business, be deemed to employ all persons employed by such contractor for such work and he alone shall be liable for the contributions measured by wages paid to such persons for such work, except as any such subcontractor who would in the absence of the foregoing provisions be liable for the payment of contributions hereunder accepts exclusive liability for said contributions under an agreement with such employer made pursuant to regulations promulgated by the Commissioner."

Under statutes such as the New York provision quoted it is important for contractors, in order to escape liability for taxes based on the wages of employees of subcontractors, to enter into written agreement with such subcontractors pursuant to general or special authority or acceptance by the state commissioner charged with the administration of the law.

Statutory provisions of the type embodied in the unemployment insurance laws and industrial compensation laws have resulted in the insertion of provisions limiting liability not only of contractors performing construction and other work, but have even caused the interpolation of such clauses in ordinary agreements for the purchase of goods to be manufactured by vendors.

A provision frequently inserted in such purchase contracts is as follows:

"The undersigned seller hereby certifies to buyer that he is an 'employer' within the meaning of the Federal acts or laws or acts or laws of the state or states wherein he operates, pertaining to Workmen's Compensation and Unemployment Compensation or Insurance, and is complying with the terms of these acts or laws. The undersigned agrees to indemnify and save harmless the buyer from any and all claims of any nature whatever, either relating to injuries or occupational disease (including death resulting therefrom) to, or caused by, any employee of said contractor or any subcontractor of his, arising in connection with any contract or order with the buyer, or relating to Unemployment Compensation or Insurance Contributions measured or based upon employment in connection therewith. The contractor agrees to reimburse the buyer for any payments made by the buyer on account of any claim made against it in this connection."

A considerable amount of discussion has taken place over the propriety of such practices.

Where, however, the taxpayer operating under a statute containing provisions such as that of New York, draws up a contract for material or services from

(Continued on page 35)

Types of Snow Plows for 1½-Ton Truck

There are different circumstances where different types of plows handle snow removal better. In the plows designed particularly for 1½-ton trucks, the one-way plow quickly moves light snows to one side of the road while the V-type plow breaks through deeper snows with less strain on the truck.

The R7-21 Junior one-way Ross snow plow, made by The Burch Corp., Crestline, Ohio, is equipped with strong long-wearing skid shoes which ordinarily give a season's service and are easily and cheaply replaced when worn out. The cutting edges are reversible and interchangeable, each with the other, to give maximum wearing quality. Snow shields or deflectors are furnished as regular equipment where desired. There is a choice of hitches for these snow plows which are built with box gussets to brace the plow both horizontally and perpendicularly where strength is most essential. The reinforcing members are placed in line with the forward motion of the plow so that they will not become obstructed with the snow or mud.

The V-type plow of the same series is interchangeable with the one-way type and is adapted particularly for opening deep drifts and plowing country roads. The shape of the moldboard is identical with that of the one-way plow, so that it lifts and rolls the snow easily. The same selection of hitches is available as well as deflectors at the top of the moldboard and the skid shoes are identical.

On the 1937 models the contour of the moldboard has been slightly changed and the moldboard itself built higher, thus increasing the suction and also giving greater capacity. The hoist frame is low and has been strengthened so that no bracing is needed over the fender. The hitch has been simplified, making the mounting of Ross plows on any truck easy and quick.

A NEW JOB FOR THE CONTRACTOR

FARM TERRACING IS ACTIVELY IN PROGRESS

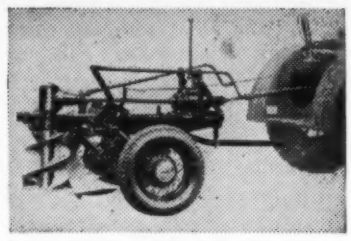
About one-third of the States have adopted it. There are still thirty or more states where the program has not started, principally because:—

THERE IS NO ONE TO DO THE WORK

The United States Department of Agriculture is urging farmers to build terrace to save the soil and moisture on the land. The farmers need contractors with suitable equipment to build the terraces and maintain them.

THIS IS A STEADY JOB

The Parsons Whirlwind is the best machine for construction and maintenance. In open contest it has been proven to build terraces FASTER, CHEAPER and BETTER than any other method.



Why not get a Whirlwind and go into this business? There are millions of acres waiting and enough work for the next fifty years.

Get particulars from your local County Farm Agent or U. S. Soil Conservation Service. We maintain a Department and field men who will gladly cooperate.

THE PARSONS CO.
Newton, Iowa
(Mention Contractors and Engineers Monthly)

HERCULES ROAD-ROLLERS

THE ACKNOWLEDGED LEADERS

IRONER ROLL - SCARIFIER - GRADER BLADE
SIZES:—6, 7, 8, 10, 12, 15 TONS
WRITE TO:

THE HERCULES CO.
MARION, OHIO, U. S. A.

This 75-ton ROGERS pneumatic-tired TRAILER is hauling a 63-ton shovel

Write for catalog No. 633

There's a ROGERS to fit every TRAILER need. Sizes: from 5-100 tons.

ROGERS BROS. CORPORATION
Albion, Pa.

Maintenance Patching on West Virginia Roads

Driving from Keyser to Romney, W. Va., last summer to visit some road-mix work, we were impressed with the quality of the patching on the roads. There was a difference in color between the patches and the existing road surface, but there the difference ended for the patches rode as smoothly as the bituminous surface on U. S. 50 in that section. After running a few miles we came to a group of five men diligently at work on a patch about 8 square yards in area. Here was a chance to find out just why the patches rode so well.

Carl Stickley, the Foreman, introduced himself and seemed justly proud of his work. He said his headquarters were at Keyser and that the bituminous material used for patching was stocked there in a large tank and the crew filled the drums for their work and hauled them out to the job. Stone for the patches was hauled from a quarry at the junction of U. S. 220 and 50. The transportation equipment consisted of two Ford trucks, one with a 3-way Wood hoist and the other with the conventional rear dump body. His other equipment included picks, shovels, brooms, a Littleford kettle with heater and hand pump for the spray, and a Galion 7-ton patching roller powered by a Hercules gas engine.

The edge of the hole to be patched is cut vertical and the hole swept clean and then painted with some of the patching bituminous material. Following this, if the hole is deep, the lower section is filled with 3-inch stone and the top with 1-inch stone. If the hole is shallow the smaller stone is used and the top covered with fines. The stone is penetrated with the bitumen by hand spraying from the kettle after the material is well heated.

The secret of a successful patch, according to Foreman Stickley, is filling to the proper depth so that the rolling will leave a well-compacted area at just the same elevation as the original surface of the road. We agree, and the outfit that tries to handle patching without a roller is trying to do the impossible. Don't leave the compacting to the man who drives a heavy truck over the road or to the tourist who is visiting the state. Do the job thoroughly before the maintenance crew leaves the job and the patches will last and be a credit to the craftsmen who made them.

C. & E. M. Photo

Hand Spraying a Bituminous Macadam Patch on a West Va. Highway

Puncture-Proof Inner Tube

A patent covering an inner tube which seals punctures in tires while the vehicle is in motion has been issued to the B. F. Goodrich Co., Akron, Ohio. The puncture-proof inner tube is made with a layer of plastic self-sealing composition on the inner side of the tube. Holes are closed without loss of air when the penetrating object is removed.

This product, known as the Seal-O-Matic tube, has been subjected to more than four years of actual road service on thousands of passenger cars and trucks, according to the manufacturer.

Breeze & Clinker Aggregates And Methods of Testing Them

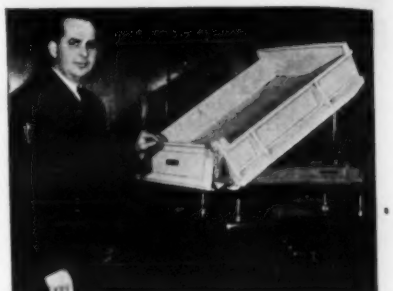
Bulletin No. 5 in the Building Research series of the Department of Scientific and Industrial Research of Great Britain, entitled "The Properties of Breeze and Clinker Aggregates and Methods of Testing Their Soundness" has recently been published. This Bulletin gives a brief account of the properties of breeze and clinker with reference to their use as aggregates for concrete, and indicates some simple methods of testing them in order to minimize the risk of failures.

Copies of this bulletin may be secured from the British Library of Information, 270 Madison Ave., New York City. Price: 20 cents.

Working Equipment Models Stimulate Keen Interest

W. H. Hammond, Sales Manager, Hoist and Body Division, Gar Wood Industries, Inc., believes that miniatures stimulate keen interest in his company's products as they attract large crowds at show exhibits and effectively demonstrate the sales features in a dramatic way.

Mr. Hammond is shown standing beside a miniature of the hydraulic hoist and dump-truck body assembly manufactured by Gar Wood. This mechanical working miniature was exhibited at the 1936 Public Works Congress in Toronto and will be placed on exhibition at the American Road Builders' Association Show in New Orleans, January 11-15, 1937, and also at the Southwest Road Show, Wichita, Kansas, February 23-26, 1937.



W. H. Hammond, Sales Mgr., Hoist and Body Div., Gar Wood Industries, Inc., and a Working Model of a Wood Hoist and Dump Body

WANTED TO BUY

85 to 125-hp. stationary gasoline engine or engine out of truck or tractor to convert into stationary power plant. Also power take-off pulley for Caterpillar Sixty.

Adirondack Lumber Co.
Wells, N. Y.

The enthusiasm of both contractors and highway officials for the new Etnyre distributor with the circulating, non-drip spray bar, is remarkable. Their acceptance of Etnyre equipment is evidenced by sales.
Write for descriptive literature

E. D. ETNYRE & CO.
DEALERS IN ALL PRINCIPAL CITIES
400 JEFFERSON ST. OREGON, ILL.

Explosives Settle Fill For Maryland Highway

(Continued from page 25)

ing pipe to clear it out. A wooden plug was originally used, but it was found that the wax paper wad would not plug up the hole, whereas the wooden plug often did.

The primer was the same as that in the springing charge and was enclosed in a similar tin tube, placed as near the center of the charge as possible. The loading pipe was then pulled, again making use of the machine, and the red flag stuck in the ground by the hole. The flag was removed when the hole was checked with a galvanometer and hooked in the circuit. All primers were tested twice with a galvanometer, once when the primers were made up and again when the holes were hooked in the circuit. After the shot was loaded, no one was allowed on the ground but the man who tested and hooked up the circuit.

Relief Shooting

It was found in shooting the 90-foot cross section that relief shots helped materially to complete acceleration. Delay electric blasting caps were first tried, but it was found that the interval between instantaneous exploders and the first delay exploders were too great. The mud moved by the relief shot had returned to the fill before the main charge had begun to move, thus defeating the purpose of the relief shots. Then a rheostat was placed in series with the electric blasting caps in the relief shot, but the interval obtained by this method was not enough. Best results were finally obtained by using two separate lead lines, one to the series of relief shots and one to the series of underfill charges. Two blasting machines were used to fire these lines and were controlled by two men who fired the relief shot first and then in quick succession the underfill charge.

Total Pounds of Extra Gelatin Used in Deep Shooting

White Marsh Swamp	1,350
Ha-Ha Swamp	8,281
Otter Creek Swamp	51,844
Bush River Swamp	80,366
Church Creek Swamp	34,389
Total	176,230

Status of Work

This work was not entirely completed when this article was written. Most of the fills are down on the center line and the Otter Creek fill is down in its entirety. The edges of the slopes will have to be shot again on Bush River and Church Creek. This shooting will complete the acceleration of the fill on the road.

This article and the diagrams are used through the courtesy of *The Explosives Engineer*.

Wodack Plans Distribution In Britain and Dominions

Arrangements have recently been completed for the manufacture of Wodack portable tools in England, according to an announcement of the Wodack Electric Tool Corp., Chicago, Ill. The tools will be manufactured by The Climax Rock Drill & Engineering Works, Ltd., 4 Broad Street Place, London, from designs and patterns identical with those used in the Wodack plant in Chicago. Distribution of the tools by the Climax sales organization will cover Great Britain and the British dominions, with the exception of Canada.

The Wodack "Do-All" combination electric hammer and drill is a convenient contractor's tool, as with different drills, it will drive into any masonry, drill into any metal, and it also grinds, buffs, polishes, and can be used as a drill press. A complete description is found in Bulletin No. 361 which may be secured from the Wodack Electric Tool Corp., 4627 West Huron St., Chicago, Ill.

Above, Ohio's Safety Highway at Night. Below, a Daytime View of the Same Highway, Showing One of the Safety Signs Placed at Intervals Along the Road.

Ohio's "Safety Highway" Has Sodium Lights

A one-mile stretch of Route 8, just north of Canton, Ohio, is the first of 48 similar demonstrations, known as "safety educational highways" to demonstrate the value of adequate visibility for safe night driving. Sponsored by the Ohio State Safety Council, this first "safety educational highway" is illuminated by twenty-five 10,000-lumen General Electric sodium vapor units.

In addition, this four-lane highway is flanked on either side by a number of neat road signs bearing concise safety messages, such as "Do You Walk Facing Traffic?" "Do You Use Hand Signals Always?" and "Did You Check Your Brakes Recently?" White lines separate the road into sections for slow and fast traffic.

The Canton safety demonstration is the first tangible step toward the goal of the Ohio State Safety Council, announced last July, to make Ohio highways the safest in America for motorist and pedestrian. The objectives of the council are good roads, good cars, good seeing conditions, and good driving.

Hercules Diesel Engines To Be Made in Holland

Hercules Motors Corp., Canton, Ohio, has announced the completion of a new and broader license agreement with N. V. Kromhout Motoren Fabriek of Amsterdam, Holland. This company is one of the oldest, largest and best-known gasoline and diesel engine designers and manufacturers in the Netherlands. For the past two years, the company has been the exclusive distributor of Hercules gasoline engines and power units in Holland and the Dutch possessions, and has as well held the rights to build gasoline engines under the Hercules designs.

Now this company has acquired in addition the exclusive right to manufacture as well as distribute Hercules diesel engines in Holland under Hercules patents. Mr. Jan Goeskoop of N. V. Kromhout Motoren Fabriek recently spent several days at the Hercules plant in Canton, at which time the exclusive manufacturing and sales arrangements were closed.

Keeping the roads open all winter is a profitable enterprise for any county in the Rocky Mountain region. Consider it only in relation to the county's share of the gas tax. By careful analysis, it has been found that the cost of keeping roads plowed open is less than is the gain in the county's share of gas tax where open roads encourage normal traffic. The gain in convenience actually costs nothing! If your county lacks modern snow removal equipment, now is the time to get it.—*The Look Around.*

ROAD WIDENING?

JAEGER TRUCK MIXERS CUT YOUR COSTS:

- High Production,
- Small Investment,
- Direct Discharge into Forms,
- Better Concrete,
- No Material Piles or Water Lines,
- No Traffic Hold-ups.

Write for Catalog, Job Data, and Prices.

THE JAEGER MACHINE CO.
701 Dublin Ave., Columbus, Ohio

JAEGER

Mall TRADE MARK

CONCRETE VIBRATORS

A Type and Size for Each Specific Job
Gas Engine—Air—Electric

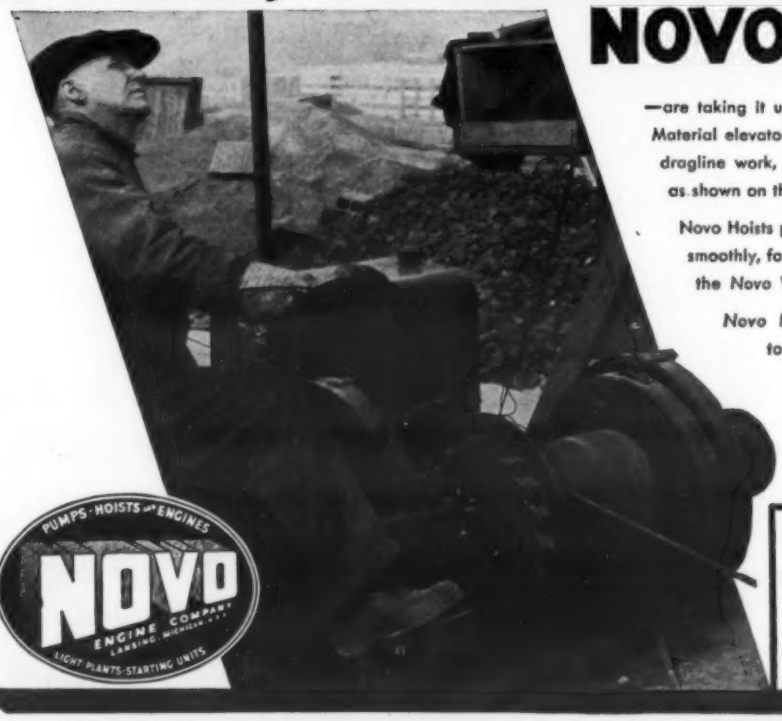
Large sized vibrators can be furnished for placing mass concrete on piers, pavements, and concrete deck slabs—medium sized for average sized walls—and small sized units for heavily reinforced structures.

For their size MALL vibrators will place more concrete than any other type of vibrator on the market.

It will pay you to investigate these efficient machines today! They will save you money in labor, material, and placement costs.

MALL TOOL COMPANY
7743 South Chicago Avenue, Chicago, Illinois
OFFICES IN ALL PRINCIPAL CITIES

SURE, Construction's UP! NOVO HOISTS—



—are taking it up every day on a wide range of jobs. Material elevators, concrete masts, pile driving, erection, dragline work, etc. Sizes range from the little devils, as shown on the left, up to 100 HP, 14,000# line pull.

Novo Hoists pick up their load easily and shoot it up smoothly, for they have a greater friction area with the *Novo V Shaped, Double Area Friction Blocks.*

Novo Patented Screw Thrust gives feather touch control, minute accuracy of operation and an ease of manipulation that cuts operation overhead and operator fatigue.

Send for descriptive literature.

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NOVO ENGINE COMPANY
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LIGHT PLANTS · STARTING UNITS

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216 Porter St., Lansing, Mich.
Send me without obligation literature and prices on Novo Hoists. Size_____
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State_____

A "Milestone Diesel" Representing 1,250,000 Diesel Horsepower Produced by Caterpillar in Little More Than Five Years

Caterpillar's 20,000th Diesel Tractor

On August 31, 1931, in the depths of the depression, the Caterpillar Tractor Co., Peoria, Ill., announced its first diesel model. On September 23, 1933, the 1,000th diesel tractor was built and on October 19, 1936, the 20,000th Caterpillar diesel tractor was dedicated with fitting ceremonies. Three-year-old Joyce Alice Barrow, champion baby of Illinois and daughter of a Caterpillar employee, held the funnel while B. C. Heacock, President of Caterpillar, poured in the fuel oil. C. Parker Holt, Executive Vice President, is shown in the photograph watching the proceedings.

This diesel tractor represents approximately 1,250,000 diesel horsepower built by the Caterpillar Tractor Co. in a little more than five years.

Vertical Turbine Pump For Dewatering Service

Vertical turbine pumps for dewatering cofferdams and similar service, ranging in capacity up to and including 10,000 gallons per minute, are made by the Worthington Pump & Machinery Corp., Harrison, N. J. These pumps, which are simple in design, compact, and dependable, may be used either as portable sinker pumps to be lowered as the water level recedes, or may be fitted with suitable pipe lengths for fixed installations.

A weatherproof motor at the top, fitted with a vertical hollow shaft, is grease lubricated to prevent leakage in transit or when the pump is not in a vertical position. The stuffing box, near the motor, is easily accessible. Impellers are of hard bronze, carefully balanced. Impeller wearing rings are renewable, and are also of bronze. Locks prevent the impeller from working loose, yet permit easy removal. The bowls contain the discharge vanes and the low head and discharge connection are of rigid cast-iron construction. At the bottom is a galvanized basket strainer which protects the pump from sticks, stones and other material which might clog it.

These pumps are rated for total dynamic heads of 20, 30, 40, 50 and 60 feet, the motor sizes varying from 5 to 250 hp, with speeds ranging from 870 to 1,750 rpm.

Bulletin W-450-B25, which may be secured upon request by mentioning this magazine, shows a vertical cross sectional view of the pump, an installation, and gives a complete table of ratings.

Concrete Convention and Equipment Show

The National Concrete Masonry Association, National Conference of Concrete Contractors, The Cast Stone Institute, The American Concrete Pipe Association and the National Cinder Concrete Products Association are holding a joint convention in the Sherman Hotel, Chicago, Ill., January 18, 19 and 20, 1937. In conjunction with these conventions there will be a concrete industry exposition of concrete equipment, accessories and supplies, including concrete mixers, block manufacturing machinery, special form systems, form clamps and many other interesting displays.

Eugene F. Olsen, Stearns Mfg. Co., is Chairman of the Exhibitors Advisory Board of the Concrete Industries Exposition. Assisting him on the Board are: Jesse H. Besser, Besser Mfg. Co.; Louis Brookman, Jr., Concrete Publishing Corp.; J. H. Chubb, Pennsylvania-Dixie Cement Corp.; D. S. Colburn, Marquette Cement Mfg. Co.; B. F. Devine, Chain Belt Co.; Lion Gardiner, The Jaeger Machine Co.; Robert Harris, Blaw-Knox Co.; A. E. Hjerpe, Consolidated Cement Corp.; D. S. MacBride, International Cement Corp.; D. H. MacFarland, Medusa Portland Cement Co., Roy N. McCandless, Cinder Block, Inc.; Frank Muenzer, Multiplex Concrete Machinery Co.; Thomas W. Noble, Thos. W. Noble Co.; H. H. Potts, Pottsco Corp.; B. H. Rader, Lehigh Portland Cement Co.; T. A. Rehnquist, T. A. Rehnquist Concrete Floor Co.; Dan F. Servey, Haydite Corp.; J. L. Shiely, J. L. Shiely Co.; Blaine S. Smith, Universal Atlas Cement Co.; H. F. Thomson, General Material Co.; Stanton Walker, National Ready Mixed Concrete Assn.; and Benjamin Wilk, Standard Building Products Co.

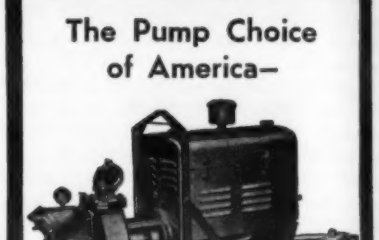
Distributor Announces New Service Manager

The Tractor & Equipment Co., 433 So. Jefferson St., Chicago, has announced the appointment of Walter H. (Wally) Wassman as Service Manager to succeed P. H. Lash who held that position from 1930 to 1936.

Mr. Wassman is thoroughly acquainted with the various phases of gasoline and diesel engine service as well as the special problems of power for construction equipment such as excavators, graders, road rollers, compressors, etc.

SIMPLE RUGGED DEPENDABLE
SELF PRIMING PUMPS
STERLING QUALITY

The Pump Choice of America—



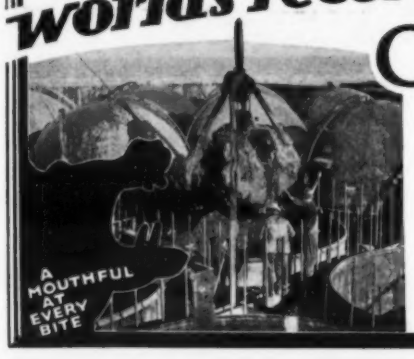
Regardless of your requirements—there's a Sterling Quality Pump for every job—from the smallest 2 inch pump to the husky 10 inch pump designed for big volume work.

Specify STERLING and be assured of successful performance by these THOROUGHLY TRIED and PROVEN PUMPS.

Write today for literature and prices.

Sterling
MACHINERY CORPORATION
Kansas City, Mo.

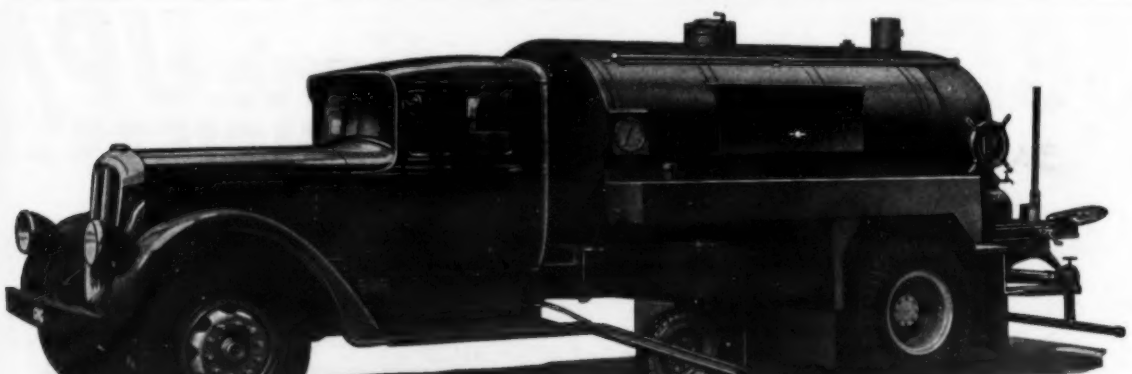
World's record bridge or simple trench
IS THE SAME TO
Owen Buckets



Whether digging caisson footings for the San Francisco-Oakland Bridge—the Golden Gate Bridge or excavating a simple sewer trench, owners of Owen Buckets profit by unusually low costs for extra long periods of service.

Years of specialized experience builds into these units, features of performance and durability which cause a large majority of bucket owners to turn to Owen for their needs.

THE OWEN BUCKET COMPANY
6030 Breakwater Avenue • Cleveland, Ohio
Branches: NEW YORK • PHILADELPHIA • CHICAGO • BERKELEY, CAL.



THREE BIG REASONS WHY . . .

Three things your 1937 Pressure Distributor should do consistently are:

1. Heat efficiently, quickly.
2. Apply material accurately.
3. Have simple, foolproof control.

The Littleford Model "C" Distributor lives up to these requirements. What's more, it stands the "gaff".

Since the Model "C" is not complicated (instead it's really quite simple), it can be depended upon when you need it.

Be ready for a big season next year. Ask for prices and data, now.

THE BEST OF A GOOD HEATER
LB
LITTLEFORD BROS. INC.

LITTLEFORD
Road Maintenance Equipment
SINCE 1900
LITTLEFORD BROS. 485 E. PEARL ST. CINCINNATI, O.

CONTRACTORS' TAX SAVINGS

Here is the first complete discussion of legally permissible tax-saving methods, covering all Federal, state and local taxes, which makes plain to contractors and sub-contractors how to conduct negotiations and operations in order to escape avoidable tax burdens. Numerous examples are presented, enabling the reader to find a precedent for the problem at hand. An oversight of one of the numerous tax saving procedures described in the book might result in a very substantial amount of avoidable expense.

PLANNING FOR TAX ECONOMY

is a reservoir of practical experiences in approved tax-saving methods. The authors, William H. Crow and Urban S. Greene, an attorney and an accountant, with backgrounds covering over 20 years of professional specialization in tax matters, have assisted in solving numerous tax problems confronting highway contractors and those engaged in heavy construction. Supplements covering tax savings in respect to Federal Income and Social Security and the State Payroll Acts will be published from time to time and furnished to purchasers of this book at a nominal price.

Sent on Approval

WALDREP-TILSON, Inc., (Dept. C)
565 Fifth Avenue, New York, N. Y.

Without cost or obligation, you may forward a copy of PLANNING FOR TAX ECONOMY by Crow and Greene. Cost, if we keep it, $7.50; otherwise we may return it within five days without further obligation.

Name _____
Firm _____
Address _____

Road Widening Job Near Provo, Utah

(*Continued from page 8*)

ing up of the grade ahead of the paver and the sprinkling of the grade to lay the dust and prevent the absorption of too much water from the concrete was handled by two men.

The concrete crew consisted of the man dumping the batches, the paver operator, two men spading the sides against the forms and five spading and shoveling to the screed of the Ord finisher.

Expansion Joints

The expansion joints were inserted at 90-foot intervals with dummy joints every 30 feet. Four men worked continually on the preparation and placing of the expansion joints. For both the expansion joints and the dummy joints special machines and approved chairs were used for holding the dowels in place during pouring. It consisted of a sheet metal plate bent to form a U and with notches cut for the easy insertion of the dowels and smaller round holes just the size of the dowels to hold them while the machine was inverted for the assembly of the joint. Then, just before the machine was placed right side up to be carried to the road, a lever at the end was thrown and locked. This pushed a bar forward through the entire joint and small arms with lugs at the ends held the dowels in place. For a 20-foot slab there were 20 dowels each 2 feet long, ¾-inch diameter and spaced 6 inches from the form and 12 inches apart. This placement was the same for the expansion joints and the dummy contraction joints except that at the expansion joints granulated cork 1-inch thick and with building paper on the outside held by asphalt paint was used. The dowels for both joints were placed 3 inches below the surface of the slab.

The expansion joint dowels had 6-inch metal sleeves on one end with a 1-inch cork to plug the outer end against the entry of concrete or grout. A 2-inch air space was left between the end of the dowel and the cork. The sleeves were placed toward the paver when setting. A 1-inch equal-leg cap was placed over the cork expansion joint when it was set and then removed by the hand finisher.

Transverse steel bars, ½-inch square, deformed, and 30 inches long were set across the center dummy joint every 36 inches and 18 inches on each side of the joints. These bars were placed on small mounds of concrete 3 inches below the finished surface shoveled into place by the puddlers. These dowels were placed 4 inches from the bottom of the slab which was 7 inches thick at the center and 9 inches thick at the edges.

Both the center and the transverse dummy joints were placed by two men who cut the joints with a saw-tooth rig made from an I-beam cut along one flange and then the teeth cut in. It has pipe handles and a plank is laid on the surface of the concrete to measure the distance from the side for the center joint. The transverse dummy joints were also cut in the same manner and the steel strips 2 x ⅜-inch inserted after oiling. The steel strips were removed by a joint finisher after the finishing was complete. On the sections where the slabs ran against old concrete the joint men cut and placed the steel dummy joint strips between the old and new concrete.

Hand Finishing

For hand finishing behind the Ord screed there were two longitudinal floats each 16 feet long and operated by four men each. The first was a box float of 2 x 8-inch lumber and the second a T float. Sometimes when the weather was not too hot, causing the concrete to set rapidly, a second T float was used. One man was kept busy wheeling concrete back from the pit to make up any deficiencies in the elevation of the concrete when floated.

After the longitudinal floats came the individual finishers operating a 10-foot drag float, pulling and edging the joints and pulling the burlap drag over the surface just before it was covered with burlap by two men and sprinkled for one night. There were two finishers, two helpers and two burlap men. Curing was completed by the spreading of 6 inches of loose damp hay, 3 pounds to the square yard, which was wet continuously through the morning of the seventh day. It could be removed after 12 days but was usually left until actually needed ahead, to prevent the need of rehandling.

The expansion and dummy joints were poured as soon as the hay was removed and swept clear of the slots.

Water Supply

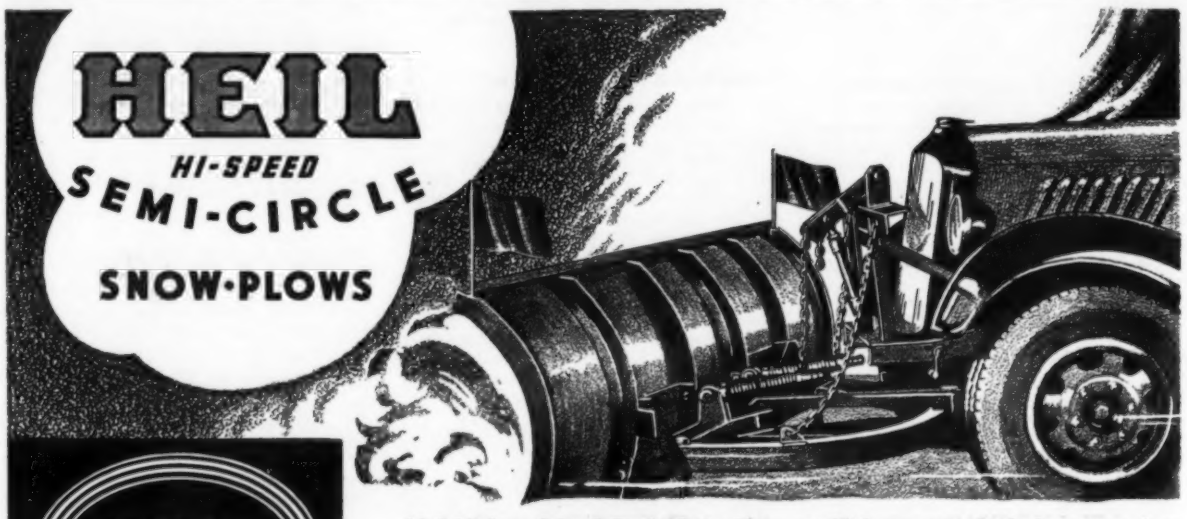
The contractor was especially fortunate in the matter of water supply for the road work as well as for the washing of gravel at his pit. On the former he was able to connect with the water supplies of both Springville and Provo at the two ends of the work and the 2-inch line required no pump as the city pressures were adequate for the service required. Valves were inserted in the line every 250 feet and the paver carried 150 feet of hose. The sprinkling hose were about 200 feet long. A shut-off valve was inserted on the line every 1,000 feet to permit cutting sections out for the removal or insertion of the valves. The large valves for the paver were moved ahead each day as required before the paver started work.

Personnel

The contractor, Strong and Grant of Springville, Utah, a city of 3,748 population but which has more contractors per thousand population than almost any other city in the country, operated this contract on a 40-hour week with two 5-hour shifts. Glenn Harrison was Superintendent for the contractor and Jack Q. Langford was Resident Engineer for the Utah State Road Commission. This project was constructed for the bid price of $157,731.90 and was known as FAP 35 A and B and 37A.

Convention Proceedings

The Proceedings of the Thirty-Second and Thirty-Third Annual Conventions of the American Road Builders' Association have just been published. This volume, containing the complete papers and discussions, is sent to members of the association without charge. For any others, the price is $10 a copy, from the American Road Builders' Association, National Press Bldg., Washington, D.C.



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902 Information on the Invader, Osgood's new ⅜-yard excavator which is easily convertible for use as shovel, dragline, clamshell crane, backhoe, or skimmer, is fully revolving and is either continuous tread crawler or truck mounted, may be secured upon request from the Osgood Co., Marion, Ohio.

Keeping Wet Jobs Dry

903 Catalog A describing the Griffin Jet 'N Drive wellpoints, which are designed to keep work in the dry and ahead of schedule, may be secured by interested contractors and engineers direct from the Griffin Wellpoint Corp., 60 E. 42nd St., New York City.

Hoists for Construction Jobs

904 Sterling hoists, which are Timken bearing equipped, have Johns-Manville asbestos frictions, high carbon ground precision shafts and improved screw thrust with positive clutch release, are described in a catalog which may be secured upon request from the Sterling Machinery Corp., 411 Southwest Blvd., Kansas City, Mo.

Diesel Power for Construction Equipment]

905 Cummins diesel engines, the feature of which is their fuel system, are described and illustrated in Booklet FS100 which the Cummins Engine Co., Columbus, Ind., will be glad to send to readers of this magazine.

Portable Asphalt Plants

906 Bulletin T-248, describing Hetherington & Berner portable asphalt plants of the tower type, for hot or cold mix, may be secured by those interested direct from Hetherington & Berner, Inc., Indianapolis, Ind.

Aggregate and Concrete Handling

907 Portable Machinery Co., Division of A. B. Farquhar Co., Ltd., Box C-1, York, Pa., will be glad to send to those interested complete information on the Porta Model 347, a portable conveyor mounted on an elevating wheel truck, on wheels or casters, or installed on stationary supports, for handling aggregates or concrete.

New Bituminous Distributors

908 The new Etnyre bituminous distributor, a feature of which is the circulating non-drip spray bar, is described in literature which E. D. Etnyre & Co., 400 Jefferson St., Oregon, Ill., will be glad to send on request.

Tarpaulins and Windbreaks

909 Fulton Bag & Cotton Mills, Atlanta, Ga., will be glad to send to those interested complete information on its line of tarpaulins and windbreaks for use in winter concrete work to protect both concrete and men.

Concrete Vibrators and Grinders

910 White concrete vibrators and grinders, in various types and sizes, are described in literature which the White Mfg. Co., Elkhart, Ind., will be glad to send on request.

Speedy Dragline Bucket

911 The bulletin "The Automatic," describing the Page Automatic dragline bucket which is built in sizes from ⅜ to 15 cubic yards capacity and is claimed to speed up work from 20 to 50 per cent, may be secured without obligation direct from the Page Engineering Co., Dept. N, Clearing Post Office, Chicago, Ill.

Asphaltic Products for Streets and Highways

912 The Texas Co., Asphalt Sales Dept., 135 E. 42nd St., New York City, will be glad to send on request to interested contractors and engineers complete information on the complete line of Texaco asphaltic products for the construction and maintenance of streets and highways.

Delivering Concrete by Pipe Line

913 Complete information on the Rex Pumpcrete system of handling concrete by pump and pipe line, a method of concrete placing which has been used on a number of gigantic concrete jobs throughout the country, may be secured direct from the Chain Belt Co., 1666 West Bruce St., Milwaukee, Wis.

A Trailer for Heavy-Duty Service

914 C. R. Jahn Co., LaCrosse, Wis., will be glad to send on request complete information on LaCrosse TuWay trailers which are designed in varying capacities for every type of heavy-duty service.

Complete Line of Road Machinery

915 The complete line of Galion road-building and maintenance equipment, including various types of graders and road rollers, is described and illustrated in literature which the Galion Iron Works & Mfg. Co., Galion, Ohio, will be glad to send free upon request.

Snow Plows for Trucks and Tractors

916 The Baker Mfg. Co., 585 Stanford Ave., Springfield, Ill., will be glad to send to interested state and county highway officials complete information on its 21 models of Baker snow plows for truck or tractor mounting.

A Surface-Material Spreader

917 Operation data and complete information on the Buckeye surface-material spreader, for material from the size of sand to 1-inch stone, may be secured by interested contractors and state and county highway engineers direct from the Buckeye Traction Ditcher Co., Findlay, Ohio.

Puller Jacks

918 Complete information on Anchor puller jacks, which work in any position, have a 6,000-pound single line pull and 10,000 pounds on two lines, and which have a thousand uses in the field, may be secured direct from Edelblute Mfg. Co., Reynoldsville, Penna.

New All-Welded Shovel Dippers

919 The new P & H all-welded shovel dippers, from ⅜ to 5 cubic yards, are fully described and illustrated in Bulletin D-6 which the Harnischfeger Corp., 4419 W. National Ave., Milwaukee, Wis., will be glad to send free on request.

A Hand Hammer Drill

920 The Cleveland H11 hand hammer drill, which is a sturdy powerful machine in the 55-pound class, is claimed to have eleven features which are described in detail in the new Bulletin No. 118 which the Cleveland Rock Drill Co., 3736 East 78th St., Cleveland, Ohio, will be pleased to send on request.

Light-Weight Excavator—Big Output

921 The Universal Crane Co., Lorain, Ohio, will be glad to send to those interested complete information on the Lorain-40, a ¾-yard unit which weighs little more than many ½-yard units yet handles a full ¾-yard dipper, this reduction in weight being due to the special design of the machinery frame.

Safe, Dependable Snow Plows

922 Heil Semicircle blade plows, features of which are its curved blade, reversible cutting edge, automatic safety blade trip, sturdy frame and hydraulic control, and which are made in two sizes for mounting on any make of truck, are described in a new bulletin which the Heil Co., 3000 W. Montana St., Milwaukee, Wis., will send on request.

Complete Line of Graders

923 The complete line of Austin-Western graders, in various sizes and models, to meet the needs of road construction and maintenance, are described and illustrated in a new Bulletin No. 1617 which the Austin-Western Road Machinery Co., Aurora, Ill., will be glad to send to interested contractors and state and county highway engineers upon request.

New Jobs for Contractors

924 Complete information on the Parsons terracer and the new type of work for contractors in farm terracing which is being urged by the Department of Agriculture may be secured by interested contractors from the Parsons Co., Newton, Iowa, by mentioning Contractors and Engineers Monthly.

New Excavator for Highways and Ditches

925 The new Ruth dredger, a speedy, flexible excavator for building highways and levees, drainage canals and ditches, is described and illustrated in a new bulletin which the Ruth Dredger Mfg. Corp., 5980 So. Boyle Ave., Los Angeles, Calif., will be glad to send on request.

Wellpoint Systems

926 Complete Machinery & Equipment Co., Inc., Dept. C, 36-40 11th St., Long Island City, N.Y., will be glad to send on request literature describing its complete wellpoint systems to dry up excavation jobs.

New ⅝-Yard Convertible Excavator

927 Literature describing the new Bucyrus-Erie 19-B convertible excavator, features of which are the high-speed digging cycle, easy convertibility, rugged construction, and dependable operation, may be secured free upon request from the Bucyrus-Erie Co., South Milwaukee, Wis.

Guns for the War with Friction

928 Suggestions as to how Alemite lubrication guns can meet your lubrication requirements are contained in the free manual "The Case of Alemite vs. Friction" which will be sent, together with a special folder on the operation of construction machinery, to interested contractors and engineers. Send your request direct to Alemite, Div. of Stewart-Warner Corp., Dept. K, 1850 Diversey Parkway, Chicago, Ill.

Information on Low-Cost Roads

929 The Technical Service Bureau of the Barrett Co., 40 Rector St., New York City, will be glad to send complete information on the use of Tarvia in the construction and maintenance of low-cost roads, as well as to give free consultations on low-cost road problems to interested contractors and engineers who write direct to the Bureau and mention this magazine.

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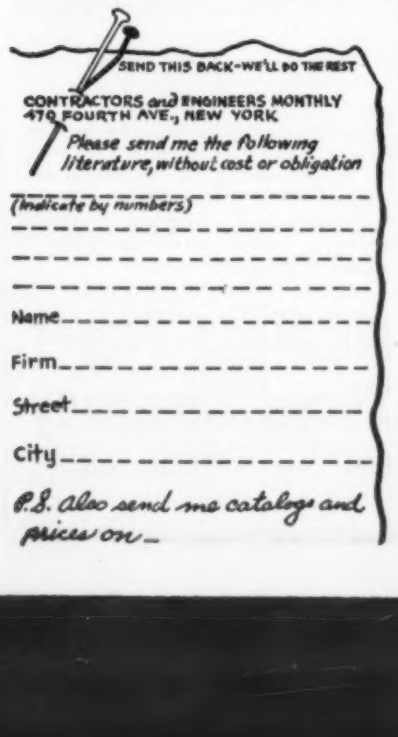
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Tax Problems

(*Continued from page 29*)

another concern contributing to the product or operations of the taxpayer, but supplied by an entirely independent organization, an appropriate provision inserted in a written agreement, approved by the Commissioner, defining the relations and placing the liability on the subcontractor, may be the only means of safeguarding against possible liability for wages paid to employees of the supplier organization.

Place of Employment

Ordinarily under the state unemployment insurance laws the place of employment is the important factor. Thus, the location of an employer outside of New York State does not exempt him from being subject to the New York law if he employs four or more persons within each of thirteen or more calendar weeks in an employment in which all or a greater part of the work is performed within New York State. Assume that a corporation organized under New York laws has a New York office, but is engaged in contracting operations in another state. Only three of its employees are employed in New York State, whereas more than twenty of its employees are at work on the job in the other state. Even though more than four of its employees reside in New York, this corporation will not be subject to the New York law. The corporation must have at least four employees performing all or a greater part of the work in New York, to be subject to the New York law. The corporation would, however, be liable under the unemployment insurance statute of the state where the work is being performed. The fact that the employer is engaged in inter-state commerce does not affect liability, as no such distinction is recognized.

Under the Unemployment Compensation Act of the District of Columbia, "employment" is defined as "any services of whatever nature, including employment in interstate commerce, performed after December 31, 1935, within the United States by any individual under any contract of hire, oral or written, express or implied, so long as the greater part, as determined by the Board under regulations prescribed by it, of the services performed under such contract is performed within the District of Columbia. ****To these, the usual exceptions as enumerated in the Federal Social Security Act, are listed."

Under the tenative rules and regulations relating to the employer under the District of Columbia Act, it is provided:

"The 'service performed' which must be considered in determining whether the greater part is performed in the District, is that performed 'under such contract'; that is, the unit of employment that is covered by the contract. Thus, if the employment is for a day at a time, the determination must be whether the greater part of the day's work is performed within the District, and so for a contract of employment for a month, a year, a season, a single occasion, or a specific job.

"If in any particular and specific case presented to the Board by an employer or employee, the facts as to the contract of employment and the place of actual performance of the services are established, a determination will be made in that particular case in accordance with the facts and the foregoing principles. Otherwise, and in all other cases, the following rules will apply:

"(a) If employees are hired for a specific job, the greater part of their services will be deemed to be performed at the location of the job.

"(b) If employees are hired for and assigned to a definite place of work, the greater part of their services will be deemed to be performed at the place thus designated.

"(c) If employees have no continuous or regular place of work but it is readily apparent that the greater part of their services are performed within the District, it will be deemed to be so performed; and conversely likewise.

"(d) If employees have no continuous or regular place of work and it is not readily apparent where the greater part of their services are performed, such greater part will be deemed to be performed at the residence of the employer."

Inclusions and Exclusions

Bearing in mind the variance in provisions and regulations in state unemployment compensation acts as to the definitions of employment, the following examples extracted from the regulations issued under the District of Columbia Act are to be read with reference to the regulations discussed in the preceding paragraphs:

"A building contractor hires a crew of carpenters to build a house in Maryland; these carpenters are performing services at the location of the job, in this instance outside the District.

"A building contractor resident in Maryland has a permanent office in Washington, where certain clerks, draftsmen and a manager are employed; it is readily apparent that these employees customarily perform their services in the District, regardless of the location of the employer's several contract jobs; they will be deemed to perform the greater part of their services within the District.

"A building contractor resident in the District regularly employs on a permanent basis certain foremen who work upon jobs in Maryland, Virginia or the District, as the need may be; it is not readily apparent where they customarily perform their work; they will be deemed to perform the greater part of their work at the place of residence of the employer, in this instance within the District."

(*To be continued in January*)

China is now aiming to strike a better balance between railways and highways but has advanced proportionately further in the latter than in the former. However, the present big railway construction program envisages needed truck lines and highways as complementary or supplementary transportation, according to a report from the U. S. Bureau of Foreign and Domestic Commerce. In North China 1,000 miles of road have been completed recently and the work continues in the central and upper Yangtze region. The network of roads now completed links up all the important centers.

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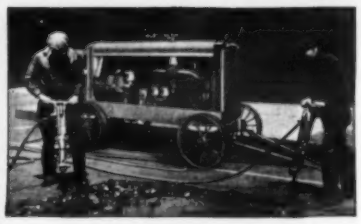

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Northwest Engrg. Co.
Novo Engine Co.
Ohio Pattern Wks. & Fdy. Co.
Ohio Valley Pulley Wks.
Page Engrg. Co.
Rochester Can Co.
Sasgen Derrick Co.
Southwest Pump Co.
Viking Pump Co.
Wall Rope Works, Inc.

F. H. BURLEW COMPANY
221-25 W. Huron St., Chicago, Ill.
Telephone SUPerior 5804

AMERICAN HOIST Crawler Cranes, Shovels, Draglines, Bulldozers, Snow Plows
BATES Wire Ties, etc.
BEEBE BROS. Hoists
CHAIN BELT Mixers, Pavers, Pumps, Saw Rigs, Conveyors, Elevators, Pumpcrete, Moto Mixers
ERIE Steel Bins, Batchers, Aggremeter Plants
INSLEY Conc. Towers, Chuting, Cranes, Shovels, Choker Hooks, Carts
M & M Form Clamps
MEYER-HECHT Adjustable Shores
NORDBERG Track Shifters and Tunnel Shovels
SASGEN Derricks
SCHRAMM Air Compressors, Tools
WELLMAN ENGR. CO. "Williams'" Clam Shell and Dragline Buckets, Trailers
WINSLOW Whlb. Scales
WYOMING Red Edge Picks, Scoops and Shovels

McKiernan-Terry Corp. (Divisions)
McKIERNAN-TERRY—Pile Hammers, Extractors
LAMBERT-NATIONAL—Hoists, Cableways
STEELE & CONDICT—Special Machinery
Wheelbarrows, Hose, Cable Rope, Tarpaulins, etc., carried in stock

Member: Associated Equipment Distributors

F. RONSTADT HARDWARE COMPANY
"Pioneers in Good Merchandising"
TUCSON ARIZONA

BROOKVILLE Locomotives
BAY CITY Shovels
GALION Graders and Rollers
McCORMICK-DEERING Industrial and Crawler Tractors
McCORMICK-DEERING Diesel and Gas Power Units
STERLING Hoists
STERLING Portable Pumps
POMONA Turbine Pumps
MYERS Pumps
KIMBALL-KROGH Centrifugal Pumps
REX Concrete Mixers and Pumps
TOLEDO Road Torches

NORRIS K. DAVIS, INC.
400 Seventh St. San Francisco, Calif.

Representing

LE ROI CO.—Gasoline Power Units and Parts
MINN. STL. & MACHY. CO.—Twin City Engines, parts
HANSON CLUTCH & MACHY. CO.—Full Revolving Shovels, Cranes, Draglines, ¾, ⅝, and ½-yd.
KEYSTONE DRILLER COMPANY—Excavating Machines, Shovels, Cranes, Draglines, Pull-Scoops, Skimmers, Plunger Shovels, Pavement Breakers
DAVIS COMPANY—Large Tilting Mixers, 1, 2, 3, and 4-yd., Weigh Batchers, Batching Plants, Manual or Full Automatic Operation, Readymix Concrete Plants and Equipment, Motor Truck Concrete Mixers and Carriers, Electrically Operated and Controlled Water Meters, Steel Silos, Bins, Bunkers, Hoppers, Bunker Gates, Chutes
D. K. CLUTCH & MACHY. CO.—Hoists & Compressors

R. S. ARMSTRONG & BRO. CO.
676 Marietta St. Atlanta, Ga.

Representing

ALLIS-CHALMERS Tractors and Road Machinery
AMES-BALDWIN-WYOMING Shovels, Scoops
BEEBE Hand Hoists
BUCYRUS-ERIE Cranes, Shovels
BUTLER Bins, Batchers
CARBIC Lights
CHICAGO PNEUMATIC Air Compressors
DOMESTIC Pumps, Hoists
GENERAL ELECTRIC Motors
HERCULES Road Rollers
HYPRESSURE JENNY Vapor Cleaning Machine
JAEGER Concrete Mixers, Pumps, Paving Machy.
JONES-SUPERIOR Saw Rigs
LAKEWOOD Road Machinery, Handling Equipment
LE ROI Engines
LIDGERWOOD Hoists
McKIERNAN-TERRY Pile Hammers
OWEN Buckets
SASGEN Derricks and Winches
CRUSCA Drill Steel
WATERLOO Bar Benders
WORTHINGTON Pumps

Member: Associated Equipment Distributors

O. T. CHRISTERSON CO.
122 So. Michigan Ave. Chicago, Ill.

Representing

KOEHRING—Mixers, Pavers, Cranes, Shovels, Dumptors, Mud Jacks
KWIK-MIX—Concrete and Bituminous Mixers
BLAW-KNOX—Road Forms, Bins, Batchers, Finishing Machines, Buckets
LITTLEFORD—Distributors, Tar Kettles, Heaters, Torches
GORMAN-RUPP—Self Priming Centrifugal Pumps
PARSONS—Trench Machines, Backfillers, Turbo Mixers
C. H. & E.—Road Pumps, Saw Rigs, 2-Ton Rollers
SPEEDER—Cranes, Shovels, Truck Crane, ½ yd.
IOWA—Crusher Plants, Asphalt Plants
R. B.—Power Subgraders, Trailgraders
WORTHINGTON—Compressors, Air Tools, Hose
CLEVELAND—Subgraders, Straight Edges, Finishing Tools
Concrete Carts, Wheelbarrows, Supplies

PEORIA TRACTOR & EQUIPMENT CO.

400 Franklin Street Peoria, Illinois

Representing

Allsteel Products Mfg. Co.
Athey Truss Wheel Co.
Caterpillar Tractor Co.
Gardner-Denver Co.
Frank G. Hough Co.
Killefer Mfg. Corp.
LaPlant-Choate Mfg. Co.
R. G. LeTourneau, Inc.
Speeder Machinery Corp.
Willamette-Hyster Co.
Universal Crusher Company

Telephone 6177

INDIANA EQUIP. CO., INC.

327-329 West Market St., Indianapolis, Ind.

Representing

ATHEY TRUSS—Wagons, Bulldozers
BUFFALO-SPRINGFIELD—Rollers
"CATERPILLAR"—Road Machinery
"CATERPILLAR"—Tractors
INGERSOLL-RAND—Compressors, Tools
LaPLANT-CHOATE—Wagons, Scrapers, Bulldozers
LE TOURNEAU—Scrapers, Buggies, Bulldozers
OWEN—Clam Shell Buckets
PAGE—Dragline Buckets
SAUERMAN—Cableways, Power Scrapers
UNIVERSAL—Crushers, Pulverizers
THEW—Shovels, Draglines
TYLER - NIAGARA—Vibrating Screens

Member: Associated Equipment Distributors

GIERKE-ROBINSON CO.

4th & Ripley Sts. Davenport, Iowa

Representing

BLAW-KNOX—Steel Road, Curb and Gutter Forms, Bins, Batchers, Clamshell Buckets, Truck Turntables, Ord Concrete Road Finishers
CHAIN BELT—Mixers, Pavers, Pumps, Saw Rigs, Conveyors, Elevators
CLYDE—Gasoline and Steam Hoists, Derricks
HOUGH-UNIVERSAL—Sweepers
SULLIVAN—Air Compressors, Tools
TRACKSON—Crawlers, Shovels and Bulldozers
THEW-LORAIN—Cranes, Shovels, Draglines
TIMKEN—Detachable Rock Bits, Steels
UNIVERSAL—Truck Cranes
UNIVERSAL—Form Clamps

Member: Associated Equipment Distributors

THOMAS L. BARRET

112-114 So. Second St., Louisville, Kentucky

C. H. & E. Road Pumps, Hoists, Saws
RUSSELL Scrapers, Drags, Plows
KNICKERBOCKER Concrete Mixers
BAY CITY Shovels and Cranes
BETHLEHEM Reinforcing Bars
PIONEER Crack and Joint Filler
KENNEDY Crushers, Screens, Elevators
LeROI High Efficiency Air Compressors
BARRET Asphalt Expansion Joint
LaCROSSE Two-Way Machinery Trailers
HERCULES Road Rollers

WE WOULD LIKE TO HAVE YOU HELP US

make this Directory of Dealers in construction equipment the most complete and accurate of its kind. Therefore, we would greatly apreciate any suggestions or corrections that you may have to offer.

CONTRACTORS AND ENGINEERS MONTHLY

470 Fourth Avenue New York

HENRY A. PETTER SUPPLY COMPANY

Paducah Kentucky

Alemite Equipment
American Wire Rope, Mesh
Bates Bar Ties
Bates Tractors
Beebe Hand Hoists
Black & Decker Tools
Cedar Rapids Crushers
Chain Belt (Rex) Mixers
D-A Lubricants
DuPont Explosives
Dobbie Derricks
Elastite Expansion Joint
Euclid Scrapers
Farquhar Engines, Boilers
General Electric Motors
Gulf States Reinforcing Steel
Hansen Excavators
Hauck Heaters and Thawers
Johnson Bins and Hoppers
LeRoi Gas Engines
Lidgerwood Hoisting Machy.
Link-Belt Cranes, Shovels
Novo Pumps and Hoists
Oxweld Apparatus
Page Buckets
Portable Conveying Machinery
Rogers Bros. Trailers
Sasgen Derricks
Sauerman Scrapers
Shunk Grader Blades
Toledo Torches
Trackson Tractors
Universal Constr. Accessories
Vulcan Pile Equipment
Wehr Graders
Western Road Machinery
Worthington Pumps
Wyoming Shovels

Equitable Equipment Co., Inc.

410 Camp Street New Orleans, La.

BROWNING Cranes and Shovels
CAMERON Pumps
CEMENT GUN Guniting and Equipment
CUMMINS Diesel Engines
DEAN BROS. Steam and Power Pumps
GENERAL ELECTRIC Motors, Arc Welders, etc.
GRUENDLER — Crushing, Pulv. Machy.
HYDROIL Goulds Oil Purifiers
INGERSOLL-RAND Air Compressors, Pneu. Tools, Pumps, Engines
MERRELL Pipe Machines
MOORE Steam Turbines, Reduction Gears
MORRIS Dredging Machy.
MUNDY Hoisting Engines
NOVO Engines, Hoists, Pumps
PLYMOUTH Gas, and Diesel Locomotives
RAMSEY Winches, Hoists
SHAW BOX Hoists, Cranes
SMITH Concrete Mixers
TROY-ENGBERG Generators, Steam Engines
WEIR-KILBY Frogs and Switches
WELDED Tanks, Pipe Barges, Pontoons
WELDING Rods and Equipment

FLETCHER EQUIP. CO., INC.

309 Magazine Street New Orleans, La.

Representing

ARCHER Towers and Chuting Equipment
BUTLER Bins, Batchers
CLYDE Hoisting Engines and Derricks
FREEMAN Turntables
GALION Graders, Rollers
LE ROI-RIX Portable Air Compressors
LE ROI Gas Engines
LINK-BELT Draglines, Cranes and Shovels
LITTLEFORD Heaters, Kettles
M & M Form Clamps
OWEN Clamshell Buckets
OMAHA Dragline Buckets
REX Mixers, Pavers, Pumps and Saw Rigs
SAUERMAN Cableway Excavators
STERLING Wheelbarrows and Carts
SIMPLEX Trench Braces and Jacks
TOLEDO Torches
WOOD Molybdenum Block Shovels

Member: Associated Equipment Distributors

ALBAN TRACTOR CO., INC.

725-27 East 25th St. Baltimore, Md.

Representing

"CATERPILLAR" Diesel Tractors, Motors
"CATERPILLAR" Road Machinery
"CATERPILLAR" Combine Harvesters
GENERAL Excavators
GRAVELY Power Mowers, Plows
KILLEFER Tillage Tools
LINK-BELT Shovels & Cranes
LA PLANT-CHOATE MFG. CO.
BABCOCK MFG. CO.
WILLAMETTE-HYSTER CO.
BAKER MANUFACTURING CO.
ROTARY SNOW PLOW CO.
ATHEY TRUSS WHEEL CO.
REX-WATSON CORPORATION
BLAW-KNOX Bulldozers, Dirtmovers
HOMESTEAD Hypressure Jenny Cleaner
MARMON-HERRINGTON All-Wheel Drive Trucks
GARDNER-DENVER CO.

Member: Associated Equipment Distributors

D. C. ELPHINSTONE, INC.

115 S. Calvert St. Baltimore, Md.
976 Nat'l Press Bldg., Washington, D. C.

Representing

Koehring Co.
Kwik-Mix Co.
Insley Mfg. Co.
Parsons Co.
Geo. Haiss Mfg. Co.
Sauerman Bros. Inc.
Allis-Chalmers Mfg. Co.
Worthington Pump & Machy. Corp.
Linn Mfg. Corp.
Owen Bucket Co.
LaBour Co., Inc.
Emerson Pump & Valve Co.
Iowa Mfg. Co.
Erie Steel Constr. Co.
H. K. Porter Co.
Reed-Prentice Corp.
Truscon Steel Co.
McKiernan-Terry Corp.
Lambert-National Hoists
Goodall Rubber Co.
Milwaux Co.
E. D. Etnyre & Co.
W. A. Riddell Co.
Hough-Universal Sweepers
Griffin Wellpoint Corp.
Huber Mfg. Co.
Viber Co., Ltd.
Wheeled Roller Corp.
Universal Form Clamp Co.

Member: Associated Equipment Distributors

JOHN C. LOUIS COMPANY

511 W. Pratt St. Baltimore, Md.

Representing

JAEGER—Concrete Mixers, Pumps, Truck Mixers, etc.
LAKEWOOD—Finishers, Forms, Tovers
AMERICAN CABLE—Tru-Lay Wire Rope
NORTHWEST—Cranes, Shovels, Draglines
BUTLER—Bins
CENTAUR—Road Mowers
ADAMS—Leaning-Wheel Graders
ALABAMA—Cast Iron Pipe
WHEELING—Corrugated Culvert Pipe
GOOD ROADS—Crushers
LITTLEFORD—Asphalt Heater, Distributors
BURCH—Spreaders
JONES—Saw Rigs
GENERAL—Wheelbarrows
TIMKEN—Detachable Rock Bits
HILYARD-NEWBOLD—Hot or Cold Asphalt Mixing Plants

Member: Associated Equipment Distributors

THE HENRY H. MEYER CO.

110 S. Howard St., Baltimore, Md.
628 Munsey Building, Washington, D.C.

Representing

Blaw-Knox Co.
Boston & Lockport Bl. Co.
Byers Machine Co.
Phillip Carey Co.
Connery & Co., Inc.
Domestic Eng. & Pump Co.
Dobbie Foundry & Mach. Co.
Duff-Norton Mfg. Co.
Galion Iron Wks. & Mfg. Co.
A. B. Farquhar Co., Ltd.
Harrington Co.
Ingersoll-Rand Co.
A. Leschen & Sons Rope Co.
Lidgerwood Mfg. Co.
Pierce Equip. Co.
Pulsometer Steam Pump Co.
Ransome Concrete Machy. Co.
Richmond Screw Anchor Co.
Sterling Wheelbarrow Co.
Templeton, Kenly & Co.
Union Iron Works
Universal Road Machy. Co.

Member: Associated Equipment Distributors

CLARK-WILCOX COMPANY

790-798 Albany St. Boston, Mass.

Representing

RANSOME—Concrete Mixers, Chuting Equip.
NORTHWEST—Cranes, Shovels, Draglines
BLAW-KNOX—Steel Forms, Bins, Buckets, "Ord" Finishers
CARTER—"Humdinger" Pumps
INGERSOLL-RAND—Air Compressors
ORR-SEMBOWER—Hoists, Boilers, Mixers
HAUCK—Oil Burners and Heaters
HAISS—Elevators, Conveyors and Loaders
ALLIS-CHALMERS—Tractors
BAKER—Bulldozers
BEEBE BROS.—Hoists
CLEVELAND—Formgraders
C. R. JAHN CO.—Trailers
BURCH—Rose Plows, Road Machinery
HOMESTEAD—Hypressure Jenny Cleaner
C. H. & E.—Pumps, Saw Tables, Hoists
PIERCE—Rollers
MICHIGAN—Shovels
COMPLETE—Wellpoints
HIPKINS—Tractioneers
BLYSTONE—Mortar Mixers

Member: Associated Equipment Distributors

THE EQUIPMENT CO.

30 Prentiss St. Boston, Mass.

Representing

Link-Belt Cranes and Shovels
Ingersoll-Rand Compressors and Tools
"Williams" Buckets and Trailers
Homelite Pumps and Generators

COMPLETE RENTAL SERVICE

Member: Associated Equipment Distributors

HEDGE & MATTHEIS CO.

285 DORCHESTER AVE. BOSTON, MASS.

Providence, R.I.; Portland, Me.; Hartford, New Haven, Conn.; Springfield, Worcester, Mass.; Concord, N.H.

Acme Road Machy. Co.
Aeroil Burner Co.
Byers Machine Co.
Chicago Automatic Conveyor Co.
Amer. Tubular Elevator Co.
Electric Tamper & Eq. Co.
Erie Steel & Constr. Co.
Four-Wheel Drive Sales Co.
Frink, Carl
Huber Mfg. Co.
Ingersoll-Rand Co.
Iowa Mfg. Co.
Jaeger Machine Co.
Jones Superior Machine Co.
A. Leschen & Sons Rope Co.
Lima Locomotive Wks., Inc. Shovel & Crane Division
Lima Manufacturing Corp.
McKiernan-Terry Corp. and Lambert-Nat'l Hoist Div.
Nebraska Bridge Supply & Lumber Co.
Parsons Co.
Red Star Products Co.
Sasgen Derrick Co.
Toledo Pressed Steel Co.
Wehr Co.
Wood Shovel & Tool Co.

Member: Associated Equipment Distributors

ABRAMS-ANDERSON CO.

Construction Equipment
10425 Northlawn Ave., Detroit, Mich.

Representing

Aeroil Burner Co.
Archer Iron Works
Bates Valve Bag Corp. (Bates Wire Ties)
Brookville Locomotive Co.
Butler Bin Company
Domestic Engine & Pump Co.
Hazard Wire Rope Company
Independent Pneumatic Tool Co.
LeRoi-Rix Compressors
Sasgen Derrick Company
T. L. Smith Company
Smith Engineering Works
Sterling Wheelbarrow Co.
Toledo Pressed Steel Co.

KELLER TRACTOR & EQ. CO., Inc.

5163-69 Martin Ave., Detroit, Mich.

Ateco—Dirt-moving equipment and bulldozers
Baker Mfg. Co.—Snow plows, road machinery
Blaw-Knox Company—Finishing machines, road forms, bins, batchers and buckets
Bucyrus-Erie Company—Shovels, cranes, draglines
Chain Belt Co.—Mixers, pavers, pumps
Caterpillar Tractor Co.—Tractors, graders, road machinery
D-A Lubricant Co.—Lubricants
Ditwiler Mfg. Co.—Hercules spreaders
Gardner-Denver Co.—Air compressors and tools
Killefer Mfg. Corp.—Road and farm tools
LaPlant-Choate Mfg. Co.—Bulldozers, backfillers, wagons, snow plows
A. Leschen & Sons Rope Co.—Wire rope
R. G. LeTourneau, Inc.—Dirt moving, road equipment
E. D. Etnyre & Co.—Oil and tar distributors and heaters
Timken—Rock bits
Universal Crusher Co.—Gravel Equipment

Member: Associated Equipment Distributors

CONTRACTORS MACHY. CO.

530 Monroe Ave., N.W. Grand Rapids, Mich.

Jaeger Machine Company
Lakewood Engineering Co.
Northwest Engineering Co.
Sullivan Machinery Co.
Pioneer Gravel Equipment Mfg. Co.
Butler Bin Company
Clyde Sales Company
Galion Iron Works
Page Engineering Co.
American Steel & Wire Co.
Bureh Corporation
Hess Snow Plows
Sasgen Derrick Company
Sauerman Brothers
Syntron Company
LeRoi Company
Aeroil Burner Company
Connery & Company
Jones-Superior Company
Moritz-Bennett Company
Ames Shovels
Rowe Manufacturing Co.
Red Top Steel Post Company
Toledo Pressed Steel Co.
Bates Wire Ties
Electric Tamper & Equip. Co.
Sterling Wheelbarrows
Trackson Co.

Member: Associated Equipment Distributors

LANGE TRACTOR & EQ. CO.

304 Lake Ave., S. Duluth, Minn.

Aeroil Tar Kettles, Heaters
Caterpillar Road Machinery and Tractors
LaPlant-Choate Wagons, Bulldozers, Snow Plows, Scrapers
Keystone Excavators, Blast Hole Drills
Diamond Gravel Crushing, Screening, Washing Plants, Conveyors
Killefer Scrapers, Road Discs, Rippers
Davey Air Compressors
Cleveland Rock Drills
Lenhart Wagons
Ames Baldwin Wyoming Hand Shovels
Blaw-Knox Ateco Scrapers, Bulldozers
Hanson Gas Shovels, Trirs.
Willamette-Hyster Hoists and Winches
Wausau Tractor and Truck Snow Plows
Davenport Gas and Diesel Locomotives
Oshkosh 4-Whl. Drive Trucks
Anthony Power Loaders
Leach Concrete Mixers
MacWhyte Wire Rope
Highway Earth Boring Machines
LeTourneau Contrs. Equip.
Speeder Shovels

Member: Associated Equipment Distributors

THORMAN W. ROSHOLT CO.

3138 Snelling Ave. Minneapolis, Minn.

Representing

IOWA "Cedar Rapids" Crusher Plants and Equip.
KOEHRING Pavers, Mixers, Cranes, Dumptor, Mud-Jacks, Shovels
RAMSEY Hoists and Winches
CHICAGO Pneumatic Compressors and Tools
McCORMICK-DEERING Industrial Tractors
KWIK-MIX Mixers
RIDDELL Power Grader
JOHNSON Batchers and Demountable Bins
TRACKSON Loaders and Cranes
BYERS Shovels and Cranes
VULCAN Steam and Gas Locomotives
LIDGERWOOD Hoists
SARGENT Snow Plows
METAL FORMS CORP. Steel Forms
ROSCO Trailers and Bituminous Distributors
STOCKLAND Graders
WALTER Trucks
GORMAN-RUPP CO. Pumps
UNION IRON WORKS
WHEELED Rollers
BUFFALO-SPRINGFIELD Rollers

Member: Associated Equipment Distributors

WM. H. ZIEGLER CO., INC.

Minneapolis, St. Paul, Duluth, Crookston, Minn.; Glasgow, Mont.

"CATERPILLAR" — Tractors, Engines, Road Machinery
LAPLANT-CHOATE—Bulldozers, Snow Plows, Dump Wagons
LeTOURNEAU—Dirt Moving, Road Equipment
KILLEFER—Road Rippers, Scrapers
ATHEY—Crawlers, Dump Wagons, Trailers
BUCYRUS-ERIE — Power Shovels, Cranes, Draglines
PIONEER—Crushers, Gravel Plants
REX—Mixers, Pavers, Mo-to-Mixers, Pumps, Saw Rigs
BUTLER—Bins, Batchers
BARBER-GREENE — Conveyers, Loaders, Ditchers
F. W. D.—Four-Wheel Drive Trucks
PLYMOUTH—Locomotives
GARDNER-DENVER—Air Compressors, Drills
LAPEER TRAILMOBILE—Semi-Trailers
LESCHEN—Wire Rope
BLAW-KNOX — Madsen Asphalt Plants, Ateco Scrapers
LITTLEFORD — Oil Distributors, Tar Kettles, Heaters
"WILLIAMS" — Buckets, Heavy-Duty Trailers
HYPRESSURE JENNY—Spray Cleaners

Member: Associated Equipment Distributors

BORCHERT-INGERSOLL, INC.

St. Paul, Minn. Duluth, Minn.

Allis-Chalmers Tractors and Graders
"American" Bulldozers, Snow Plows
Blaw-Knox Bins, Forms, Buckets, Finishers
B-B Hand Hoists
Clyde Hoists, Derricks
Cleveland Formgraders
Diamond Crushers, Screens
Domestic Pumps
Euclid Wagons, Scrapers
Gopher Road Signs
Haiss Loaders
Hercules Road Rollers
Hough-Universal Sweeper
Koppel Industrial Cars
McKiernan-Terry Pile Hammers, Extractors
M-W Lubricants
Michigan Power Shovel
Northern Conveyors
Northwest Shovels, Cranes
Oshkosh 4-whl. Dr. Trucks
"RB" Power Subgraders
Smith Mixers, Pavers
Sullivan Compressors, Tools
Tore Highway Mowers
Whitcomb Locomotives

Member: Associated Equipment Distributors

HAVE YOU CHANGED YOUR LOCAL ADDRESS?

Sometimes in the rush of moving to a new location you fail to send us your new address. And as we are anxious to get your copy of the magazine to you on time do not put off writing us. Thank you.

CONTRACTORS AND ENGINEERS MONTHLY

470 Fourth Ave. New York

BUBLITZ MACHINERY CO.

2141 Washington St., Kansas City, Mo.

Representing

Jaeger Machine Co.
Lakewood Engineering Co.
Thew Shovel Co.
Barber-Greene Company
Iowa Manufacturing Co.
McKiernan-Terry Corp.
Whitcomb Locomotive Co.
Butler Bin Co.
"Williams"—Buckets and Trailers
Slusser-McLean Scraper Co.
Ames Baldwin Wyoming Co.
MacWhyte Co.
Red Star Products Co.
Sasgen Derrick Co.
Climax Engineering Co.
Schramm, Inc.

Member: Associated Equipment Distributors

O. B. AVERY COMPANY

1325 Macklind Avenue St. Louis, Mo.

Exclusive Distributors for

American Steel Works
Austin-Western Road Machinery Co.
Blaw-Knox Co.
Chain Belt Co.
Dayton Sure Grip & Shore Co.
C. R. Jahn Co.
Kewanee Machinery & Conveyor Co.
Koh Manufacturing Co.
McKiernan-Terry Corp.
Northwest Engineering Co.
R. B. Equipment Mfg. Co.
Sullivan Machinery Co.
Vulcan Locomotive Works
Koppel Industrial Car & Equip. Co.
Baroo Mfg. Co.

Member: Associated Equipment Distributors

CORBY SUPPLY COMPANY

3942-46 W. Pine Blvd., St. Louis, Mo.

Representing

AMERICAN—Flexible Metal Hose
BUHL CO.—Portable Air Compressors
CHAMPION RIVET CO.—Rivets and Welding Rod
DETROIT HOIST & MACH. CO.—Air and Electric Hoists
DeVILBISS CO.—Paint Spray Equipment
HARDSOCG WONDER DRILL CO.—Rock Drills and Paving Breakers
WM. H. KELLER, INC.—Super Pneumatic Tools
MUNSELL—Air-Operated Concrete Vibrators
PANGBORN CORP.—Sandblast Equipment
PENNSYLVANIA—Air Compressors and Pumps
DAVID ROUND & SON—Chain Hoists
STAYNEW—Air and Pipeline Filters
N. A. STRAND & CO.—Flexible Shaft Equipment
VAN DORN—Electric Drills, Grinders and Buffers
VICTOR—Welding and Cutting Apparatus
WESTINGHOUSE—Arc Welding Equipment
GUSTAV WIEDEKE CO.—Tube Expanders

JOHN FABICK TRACTOR CO.

Gravois & Iowa Aves. St. Louis, Mo.

Representing

Athey Truss Wheel Co.
Cleveland Rock Drill Co.
Blaw-Knox Company
Caterpillar Tractor Co.
Davey Compressor Co.
Euclid Road Machinery Co.
Killefer Mfg. Co.
LaPlant-Choate Mfg. Co.
Pioneer Gravel Equip. Mfg. Co.
Thew Shovel Company
Willamette-Hyster Co.
W. K. M. Company
R. G. LeTourneau, Inc.
Ramsey Machinery Co.

Member: Associated Equipment Distributors

JOSEPH KESL TRACTOR & EQUIP. CO.

1510 North 13th St. St. Louis, Mo.

Allis-Chalmers Mfg. Co.
American Steel Scraper & Wheelbarrow Co.
The Baker Mfg. Co.
Continental Roll & Steel Foundry Co.
Wm. Bros Boiler & Equip. Co.
Erie Steel Construction Co.
Gardner-Denver Co.
General Wheelbarrow Co.
Lyle Signs, Inc.
Toledo Pressed Steel Co.
Aeroil Burner Co., Inc.
Contractors Machinery Corp.
Domestic Engine & Pump Co.
Diamond Iron Works, Inc.
Orr & Sembower, Inc.
Bucyrus-Erie Co.
Construction Machy. Co.
Fairbanks, Morse & Co.

Member: Associated Equipment Distributors

C. F. RABBEITT, INC.

1523 N. Broadway St. Louis, Mo.

Representing

C. H. & E. Mfg. Co.
Cleveland Formgrader Co.
Cleaver-Brooks Co.
Huber Mfg. Co.
Insley Mfg. Co.
Koehring Co.
Kwik-Mix Mixer Co.
Lidgerwood Mfg. Co.
Littleford Bros.
Parsons Co.
Union Iron Works, Inc.
Butler Bin Co.
Frank G. Hough Co.
Metal Forms Corp.
Thorman W. Rosholt Co.
Sterling Machinery Corp.

Member: Associated Equipment Distributors

THE GEO. F. SMITH CO.

Franklin & Channing Aves., St. Louis, Mo.

Complete Plants Rented

Ingersoll-Rand—Compressors, Air Tools
Clyde—Hoists and Derricks
Owen—Clamshell Buckets
Hauck—Heaters
Sasgen—Derricks & Winches
Skilsaw—Electric Saws, Drills
Skelton—Shovels
LeRoi—Engines
Symons—Column Clamps
Winslow—Weighing Scales
Universal—Form Clamps
Link-Belt—Cranes, Shovels, Draglines
Novo—Pumps
Vulcan—Steam and Drop Hammers
Waukesha—Engines
Mall—Vibrators and Grinders
Archer—Tower Equipment
Red Star—Wheelbarrows and Shores
Templeton, Kenly & Co.—Trench Braces, Jacks
Smith—Mixers, Pavers
Vail—Tie Wires and Tools
American Steel & Wire—Rope

Member: Associated Equipment Distributors

CONNELLY MACHINERY CO.

500 No. 27th St., Billings, Mont. 315 2nd Street So., Great Falls, Mont.

Distributors of

Caterpillar Tractors, Engines, Road Machinery
Pioneer Gravel Plant Equip.
Bucyrus-Erie Shovels, Draglines and Cranes
Bucyrus-Erie Loadmasters
Buckeye Ditchers, Backfillers
Buffalo-Springfield Road Rollers
D-A Lubricants, Oils
Hewitt Belting, Hose
Le Tourneau Dirt Moving, Road Bldg. Equip.
Kehler Lighting Plants
LaCrosse Tu-Way Trailers
Hough-Universal Road Sweepers
Standard Paving and Plant-Mix Oiling Plants, Distributors, Trailer Oilers and Heaters
Leschen's Wire Rope
Homestead Hypressure Jenny

Tractor-operated Hoists, Scrapers, Dirtmovers, Rippers, Scarifiers, Bulldozers, Trailbuilders, Backfillers, Snow Plows, Loaders, Trunk-type and Wheeled Wagons and Trailers, etc.

Member: Associated Equipment Distributors

HALL-PERRY MACHINERY CO.

802-12 E. Iron St., Butte, Mont.

Representing

American Cable Co.
Atlas Imp. Diesel Eng. Co.
Butler Bin Co.
Chain Belt Co.
Cleaver-Brooks Co.
Cuffing Hoist Co.
Columbia Steel Casting Co.
E. D. Etnyre & Co., Inc.
Elgin Corporation
Euclid Road Machy. Co.
Foote Company
Galion Iron Wks. & Mfg. Co.
Gardner-Denver Co.
Goodyear Tire & Rubber Co.
Jos. F. Kiesler Co.
Hansen Trailers
Hazard Wire Rope Co.
Madsen Iron Works
Marmon-Herrington Co.
Mohawk Asphalt Heater Co.
Novo Engine Co.
Ohio Valley Pulley Works
Portable Machinery Co.
Ramsey Winches
Rotary Snow Plow Co.
Sauerman Bros., Inc.
Thew Shovel Company
Timken Roller Bearing Co.
Willett Mfg. Co.

Member: Associated Equipment Distributors

NORTHWEST EQUIP. CO., Inc.

Box 1112 Great Falls, Mont.

Complete Line of Road Machinery and Contractors' Equipment

Representing

PIONEER Gravel Equip.
KOEHRING Mixers, Pavers, Shovels
INSLEY Concr. Towers
PARSONS Ditchers
PANTHER Oil, Grease
COLEMAN Trucks
OWEN Buckets
SCHRAMM Air Compressors
MacWHYTE Rope
CLEVELAND Rock Drills

Steel Bridges and Traffic Treads, Fresnos, Plows, Scrapers, etc.

HEYNIGER BROTHERS

Contractors' Equipment

6th Ave. and F St. Belmar, N. J.

JAEGER Concrete Mixers
JAEGER Placing Plants
AEROIL Torches, Heaters

Steel Sidewalk and Curb Forms
"Mud Hog" Pumps
Material Elevators
Air Compressors
Gasoline Hoists
Trench Pumps
Carbic Lights
Wheelbarrows
Mortar Tubs
Steel Mortar Boxes
Picks and Shovels
Tarpaulins
Scaffold Horses
Electric Drills & Saws
Chain Hoists

DALE & RANKIN, INC.

113 Frelinghuysen Ave., Newark, N. J.

Representing

HELTZEL Road Forms and Bins
P & H Cranes and Excavating Equipment
P & H Hansen Electric Arc Welders
INGERSOLL-RAND Compressors and Tools
STERLING Wheelbarrows
AEROIL Heaters and Tools
ALEMITE Guns and Fittings
REX Mixers and Pavers
REX Pumps
REX Saw Rigs
UNIVERSAL Concrete Accessories
VIBER Elec. & Pneu. Concrete Vibrators
WINSLOW Scales

Member: Associated Equipment Distributors

JOHNSON & DEALAMAN, INC.

60 Marshall Street Newark, N. J.

Representing

RANSOME Pavers, Mixers, Chuting Equipment
SCHRAMM Air Compressors, Tools
ALLIS-CHALMERS Tractors, Graders
JOHNSON Steel Bins and Batchers
ERIE Gasoline Rollers
MARLOW Centrifugal, Diaphragm and Plunger Pumps
ETNYRE Tar and Asphalt Distributors
WILLIAMS Trailers and Buckets
RED STAR Wheelbarrows, Batch Boxes, Column Clamps and Adjustable Shores
OSGOOD Shovels, Cranes and Draglines
GENERAL Shovels, Cranes and Draglines
HOTCHKISS Road and Sidewalk Forms
VIBRO-CAST & JACKSON Concrete Vibrators and Elec. Power Plants
AMERICAN Snow Plows
HY-WAY Spreaders

CONTRACTORS WHITE SALES CORP.

Wolfert Ave. at Broadway, Albany, N.Y.

Representing

White Motor Co.—Trucks and Buses
Allis-Chalmers Mfg. Co.—Tractors, Road Machy.
Jaeger Machine Co.
General Excavator Co.
Link-Belt Co.
Baker Mfg. Co., Inc.
Huber Mfg. Co.
Hough Universal Sweepers
Main Steel Products Co.
Pioneer Gravel Eq. Mfg. Co.

DOW & COMPANY, INC.

Court & Wilkeson Sts., Buffalo, N.Y.

Exclusive Distributors of

ADAMS—Leaning Wheel Graders
BARCO—Gasoline Hammers
BURCH—Spreaders, Maintainers, etc.
C. H. & E.—Pumps, Hoists, Saw Rigs
CHICAGO PNEUMATIC TOOL CO.—Compressors, Drills
EUCLID—Earth-Moving Equipment
FRINK—Sno Plows
HOUGH-UNIVERSAL—Sweepers
McCORMICK-DEERING—Tractors
"METAFORMS"—Concrete Forms
MOHAWK—"Hotstuf" Kettles, Burners
T. L. SMITH—Mixers, Pavers, Tower Pavers
THEW-LORAIN—Shovels, Cranes
TONCAN—Corrugated Culverts
UNIVERSAL-LORAIN—Shovels, Truck Cranes
WALTER—Snowfighters, Tractor Trucks
"WILLIAMS"—Buckets, Trailers
WILLIAMSPORT—Wire Rope

Member: Associated Equipment Distributors

LLOYD G. ROSS

3090 Main St. Buffalo, N. Y.

Representing

General Excavator Co.
Hercules Roller Co.

Sale and Rent of All Kinds of Construction Equipment

EUGENE F. VAN NAME

116 John Street Horseheads, N. Y.

Representing

ALLIS-CHALMERS—Tractors, Graders
A-W—Traffic Tread
BAKER—Road Drags, Snow Plows
C. M. C.—Wonder & Marsh-Capron Mixers
HUBER—Rollers
HOTCHKISS—Sidewalk Forms
HANSON—Excavators
INGERSOLL-RAND—Air Compressors
JACKSON—Wheelbarrows
MILES—Concrete Block Machines
THE NORTHERN—Gravel & Coal Conveyors
WILLIAMSPORT—Wire Rope
WISCONSIN SPECIAL—Snow Plows

JOHN R. TINKLEPAUGH

LIVINGSTON NEW YORK

also

924 Central Avenue, Albany, N.Y.

Representing

Cleveland Tractor Company
Gar Wood Industries, Inc.
York Modern Corporation
Oshkosh Motor Truck Mfg. Co.
Euclid Road Machy. Co.
Killefer Mfg. Co.
Main Steel Products Co.

COMPLETE MACHINERY & EQUIPMENT CO., Inc.

"Specialists in Pumps"

Webster Ave. and Hancock St.
Long Island City New York

Representing

RALPH B. CARTER CO.—Humdinger Self-Priming Centrifugal Pumps
HUMPHREYS MFG. CO.—Diaphram, Plunger and Centrifugal Pumps
LEACH CO.—Concrete Mixers
INGERSOLL-RAND CO.—Air Compressors
COMPLETE—Wellpoint Systems
KADCO CORP.—Dust Control Equipment
RENTAL SERVICE

Member: Associated Equipment Distributors

GEORGE MALVESE & CO.

New Hyde Park, N. Y.

Long Island Distributors:

CLETRAC Crawler Tractors
"SILVER KING" Tractors
ADAMS Graders
SARGENT Snow Plows
LOCKE Power Mowers
REX Pumps, Mixers
EUCLID Scrapers
OLIVER Implements
BRODERICK & BASCOM Wire Rope

WORTHINGTON Power Mowers

"Brooks for Concrete Equipment"

R. E. BROOKS COMPANY

Equipment for Contractors

50 Church Street New York, N.Y.

Blaw-Knox Co.—Road and Sidewalk Forms, Bins, Batchers, Finishing Machines, Spreaders, Buckets
Cleaver-Brooks Co.—"OILBILT" Boilers, Tank Car Heaters
Insley Mfg. Co.—Excavators, Concrete Chuting Plants, Buckets, Cars
Koehring Company—Pavers, Mixers, Shovels, Cranes, Mud Jacks
Kwik-Mix Mfg. Co.—Concr. Mixers
Master Vibrator Co.—Concr. Vibrators
Parsons Co.—Trench Machines
Rosco Mfg. Co.—Oil Distributors

A. P. DIENST CO., Inc.

Contractors' Supplies

140th St. & 3rd Ave., New York, N. Y.

Distributors for

GREDAG Grease
TOLEDO Bull Frog Wheelbarrows
WYOMING Red Edge Shovels
DUFF Sewer Trench Braces
CURRY Wire Ties
KEYSTONE Grease

Telephone MOtt Haven 9-5430

MAHONEY-CLARKE, INC.

Complete Line of Contractors' Equipment and Supplies.

217 Pearl Street New York, N.Y.

Representing

Riddell Graders
Hercules Road Rollers
Schramm Compressors
Marlow Self-Priming Pumps
Munsell Pneumatic Concr. Vibrators
Osgood Shovels, Cranes, etc.
Cleveland Rock Drills, Pneu. Tools
Thurston Detachable Bits
Vulcan Pile Hammers, Extractors, Parts
Wiley Concrete Buckets

Rental Service

H. O. PENN MACHY. CO., INC.

140th St. & East River Bronx, N. Y.

Representing

CATERPILLAR Tractors and Accessories
LaPLANT-CHOATE MFG. CO.
ATHEY TRUSS WHEEL CO.
BLAW-KNOX Dirt-Moving Eq.
R. G. LeTOURNEAU, INC.
MARION Shovels, ¾-2 yds.
SPEEDER Shovels, ½-⅝ yd.
DEERE Indus. Tractors
SMITH Mixers, Pavers
LeROI Compressors, Engines
HELTZEL Steel Bins, Forms
FRINK Sno Plows
MARLOW Pumps
KIESLER Buckets

Warehouse Stock—Service Station

Member: Associated Equipment Distributors

JOHN REINER & CO., Inc.

29 Howard St. New York, N. Y.

Representing

NOVO ENGINE CO.—Gasoline Engines
WISCONSIN MOTOR CORP.—Gasoline Engines and Power Units
PERFEX RADIATOR CO.—Radiators
STOVER MFG. & ENGINE CO.—Diesel Engines, Generating Sets
TWIN DISC CLUTCH CO.—Clutches

Telephone CAnal 6-0286

UNITED HOISTING CO., INC.

165 Locust Avenue
NEW YORK, N. Y.

Representing

Sullivan Machinery Co.
Construction Machinery Co.
White Mfg. Co.

Member: Associated Equipment Distributors

N. P. WALTON, JR.

39 Cortlandt Street New York, N. Y.

Representing

JAEGER MACH. CO.—Truck Mixers, Finishing Machines, Road Forms, Spreaders
D. C. ELPHINSTONE, INC.—"BEST" Stone and Chip Spreaders
ERIE STEEL CONSTRUCTION CO.—All-Steel Bins, Complete Aggremeter Plants, Erie Buckets, Clamshell, Dragline and Electric
IOWA MFG. CO.—"CEDAR RAPIDS" Crushers, Material Handl. Equip.; Sand, Gravel and Asphalt Plants
THE KRON CO.—Full-capacity Springless Dial Scales
HANDY SACK BALER CO.—Cement Sack Cleaners, Balers

BREWSTER & WILLIAMS, INC.

Contractors' Supplies and Equipment

306 S. Salina St. Syracuse, N. Y.

Representing

AMERICAN HOIST Shovels, Cranes, Derricks, Hoists
BUTLER Bins and Measuring Hoppers
C. H. & E. Contractors' Pumps, Hoists, Saw Rigs
HAISS Loaders, Excavators, Conveyors and Buckets
HOTCHKISS Steel Forms
LITTLEFORD Asphalt Heaters and Tools
ROGERS Trailers
SULLIVAN Compressors, Drills and Hoists
WEHR Power Graders

Member: Associated Equipment Distributors

THE SYRACUSE SUPPLY CO.

314 W. Fayette St. Syracuse, N. Y.

Warehouse 358 W. Jefferson St.

Atlas Powder Co.
Barber-Greene Co.
Blaw-Knox Co.
Caterpillar Tractor Co.
Centaur Tractor Co.
Clyde Sales Co.
Goodyear Tire & Rubber Co.
Gorman-Rupp Co.
Goulds Pumps, Inc.
Hazard Wire Rope Co.
Ingersoll-Rand Co.
Johns-Manville (Bridge Plank)
Killefer Mfg. Co.
Koehring Co.
LaPlant-Choate Mfg. Co.
Insley Mfg. Co.
Parsons Co.
Rumsey Pump Co.
Universal Form Clamp Co.
Wickwire Spencer Steel Corp.
Williamsport Wire Rope Co.
Timken Roller Bearing Service & Sales Co.—Timken Bits & Rods
Iowa Mfg. Co.
R. G. LeTourneau, Inc.

Member: Associated Equipment Distributors

NORTH CAROLINA EQ. CO.

P.O. Drawer 426, 3116 Hillsboro St.
RALEIGH, NORTH CAROLINA

Br. Off. & Warehouse—No. 1 London Road Phone 411, Asheville, N. Car.

American Cable Company
Aeroil Burner Company
Buckeye Traction Ditcher Company
Cleveland Rock Drill Co.
Continental Roll & Steel Foundry Co.
Day Pulverizer Company
Euclid Road Machy. Co.
The Four Wh. Dr. Auto Co.
Galion Iron Wks. & Mfg. Co.
Galion Allsteel Body Co.
Good Roads Mach. Corp.
Hvass Sales Corp.
Iowa Manufacturing Co.
Internat'l Harvester Co.
Jaeger-Lakewood Company
Jeffrey Manufacturing Co.
The C. S. Johnson Company
Kensington Steel Company
Kinney Manufacturing Co.
Jos. F. Kiesler Company
Miami Trailer & Scraper Co.
Michigan Power Shovel Co.
Northwest Engineering Co.
Page Engineering Company
Rogers Brothers Corp.
Schramm, Inc.
Waukesha Motor Company
Willett Manufacturing Co.
Wheeled Roller Corporation
Elgin Corporation

Member: Associated Equipment Distributors

CAROLINA TRACTOR & EQUIPMENT COMPANY

S. Main Ext. Salisbury, N. Car.

Branch Office and Warehouse: 733-35 West Hargett St., Raleigh, N. Car.

ETNYRE—Bituminous Distributors, Flushers
GORMAN-RUPP—Centrifugal Pumps
CATERPILLAR—Tractors, Graders, Power Plants
BLAW-KNOX—Steel Forms, Bins, Buckets, Trukmixers
BARBER-GREENE—Conveyors, Car Unloaders
DIAMOND—Roll, Jaw Crushers
HERCULES—Gas Road Rollers
LaPLANT-CHOATE—Wagons, Bulldozers
SLUSSER-MacLEAN—Wheelers, Rippers, Fresnos
THEW—Shovels, Cranes
WONDER—Mixers, Pumps, Hoists
GARDNER-DENVER—Air Compressors, Drills
LaCROSSE—Trailers
LeTOURNEAU—Carry-All Scrapers

Member: Associated Equipment Distributors

THE BLAISDELL-FOLZ EQUIP. CO.

2143-2147 Barnard St. Cincinnati, Ohio

Representing

Allis-Chalmers Mfg. Co.—Tractors, Road Machinery
Chain Belt Co.—Rex Pavers, Moto-Mixers, Building Mixers and Pumps
Northwest Engineering Co.—Gasoline Shovels, Cranes, Draglines, Pull Shovels
Ingersoll-Rand Co.—Compressors, Pneumatic Tools, Pumps
Clyde Sales Co.—Hoisting Engines, Derricks
Dravo-Doyle Co.—American Tubular Towers
Sauerman Bros., Inc.—Cableways, Power Scrapers, Excavators
Universal Crusher Co.—Crushers
The C. S. Johnson Co.—Bins, Batchers
Deister Machine Co.—Plat-O Vibrator Screens
Vulcan Iron Works—Pile Hammers
Wellman Engineering Co.—Clamshell, Dragline Buckets
Sasgen Derrick Co.—Derricks

Member: Associated Equipment Distributors

THE CLETRAC OHIO SALES CO.

E. 193rd Street and Euclid Ave.
Cleveland Ohio

Representing

THE CLEVELAND TRACTOR CO.—Crawler Tractors
THE DAVEY COMPRESSOR CO.—Air-Cooled Compressors
THE EUCLID ROAD MACHY. CO.—Crawler Wagons, Scrapers
MAIN STEEL PRODUCTS CO.—Snow Plows
D-A LUBRICANT CO.—Oil
THE ROC COMPANY—Winches

LOOK THIS DIRECTORY OVER CAREFULLY

If you find any errors while checking over this directory will you please advise us, because it is our desire to keep it accurate and up to date at all times.

CONTRACTORS AND ENGINEERS MONTHLY

470 Fourth Avenue New York

H. B. FULLER EQUIP. CO.

1836 Euclid Ave. Cleveland, Ohio

Representing

Blaw-Knox Company—Bins, Batches, Forms, Trukmixers, Buckets, ORD Finishing Machines, Asphalt Plants
Link-Belt Co.—Shovels, Cranes, Draglines, Locomotive Cranes
Ransome Concr. Machy. Co.—Pavers, Constr. Mixers, Towers and Chuting Equip.
Baldwin Locomotive Works (Internal Combustion Division—"Whitcomb Locomotives")—Gasoline, Diesel, Elec. and Storage Battery Locomotives
Electric Tamper & Equip. Co.—Concrete Vibrators, Elec. Tampers
Moritz-Bennett Corp.—Rd. Shoulder Finishers, Form Pullers
Concrete Surfacing Machinery Co.—"Berg" Surfacers
C. H. & E. Mfg. Co.—Pumps, Saw Rigs, Hoists, Mixers, etc.
Gruendler Crusher & Pulv. Co.—Hammer Mills, Shredders, Jaw Crushers, Screens, etc.

INDUSTRIAL ENGINE PARTS, INC.

1053 E. 61st St. Cleveland, Ohio

Representing

Minneapolis-Moline Power Impl. Co.
Climax Engineering Co. **Twin Disc Clutch Co.**
Fuller & Johnson Mfg. Co.
Wisconsin Motor Corp. (Air-Cooled)
Stover Engine & Mfg. Co.
Scintilla Magneto Co.
Wico Electric Co. **Pierce-Governor Co.**
Portable Power Tool Corp. **Hercules-Servel, Inc.**
LeRoi Co.

W. T. WALSH EQUIPMENT CO.

3088 West 106th St., Cleveland, Ohio. Tel. Clearwater 4400

Barco Mfg. Co.—Gasoline Hammers
Bonnet Company—Crushers
Cleveland Rock Drill Co.—Air Tools
Diamond Iron Works—Crusher Plants
The C. S. Johnston Co.
Foote Company—Pavers
General Excavator Co.—Shovels
Hough-Universal—Sweepers
Huber Mfg. Co.—Rollers
White Mfg. Co.—Asphalt Plants, Tar Kettles, Kerosene Torches, Concr. Vibrators
McKiernan-Terry Corp.—Pile Hammers
Michigan—Power Shovels
Novo Engine Co.—Engines, Light Plants, Pumps
R-B Equipment Co.—Finegraders
Rosco Mfg. Co.—Rosco Distributors & Oilers
Schramm, Inc.—Air Compressors
Timken—Bits
Viber Co., Ltd.—Vibrators
Wellman Engineering Co.—"Williams" Buckets
Allis-Chalmers—Tractors
Construction Machy. Co.—Mixers

Member: Associated Equipment Distributors

J. C. HOUSTON

30 Church Street New York, N.Y.

Representing

BROWNING CRANE & SHOVEL CO.

HOISTING MACHINERY CO.

Warehouse

ELIZABETH, N.J.—L.V. R.R.

SOUTHERN OHIO EQUIP. CO

169-171 W. Main St., Zanesville, Ohio

On Route 40

Phone 813

Distributors for

Allis-Chalmers Mfg. Co.
Iowa Mfg. Co.
General Excavator Co.
W. A. Riddell Co.
Schramm, Inc.
Cleveland Rock Drill Co.
Timken Roller Bearing Co.
D-A Lubricant Co.
Shunk Mfg. Co.
Apollo Culvert Works
Blusser-McLean Co.
Williamsport Wire Rope Co.

CLYDE EQUIPMENT CO.

Contractors' Equipment and Supplies

Portland, Ore. Seattle, Wash.

Atlas Imperial Diesel Eng. Co.
Blaw-Knox & Western Pipe Corp.
Clyde Iron Works
Homelite Corp.
Lincoln Electric Co.
Bucyrus-Erie Co.
Geo. Halss Mfg. Co., Inc.
Sauerman Brothers
Sullivan Machinery Co.
Klauer Mfg. Company
T. L. Smith Co.
Allis-Chalmers Mfg. Co.
LeRoi Company
Beebe Bros.
Kohler Co.
Buffalo-Springfield Roller Co.
Wm. Bros Boiler & Mfg. Co.
Smith Engineering Works

Member: Associated Equipment Distributors

HOWARD-COOPER CORPORATION

Portland — Seattle — Spokane — Twin Falls

Representing

Internat'l Harvester Co. (McCormick-Deering Industrial Tractors)
Barber-Greene Co.
Cleveland Rock Drill Co.
Marion Steam Shovel Co.
Hughes-Keenan Co.
Cleaver-Brooks Co.
The Jaeger Machine Co.
Nordberg Mfg. Co. (Symons Crushers)
McKiernan-Terry Corp.
Rotary Scew Plow Co.
Schramm, Inc. (Compressors)
Universal Power Shovel Co.
Buda Co. (Diesel & Gas. Eng.)
Baker Mfg. Co.
Walter Motor Truck Co.
Seagrave Corp.
B. F. Goodrich Rubber Co. (Fire Hose)
Winslow (Scales)
Hercules Company
Sterling Wheelbarrow Co.
Root Spring Scraper Co.
White Mfg. Co.
Erie Steel Const. Co.
Wheeled Roller Corp.
J. D. Adams Co.

Member: Associated Equipment Distributors

GASH-STULL CO.

Chester Pennsylvania

Representing

FORDSON Tractor and Equipment
UNIVERSAL POWER SHOVEL CO. Unit Shovels ⅜ to ½-yd.
OSGOOD Shovels—all types
WEHR CO.—Road Graders, all sizes
TRACKSON CO.—Crawler Wagons, Crawlers
MICHIGAN Power Shovels
SCHRAMM Compressors

LOCOMOTIVES
HOISTS — SCRAPERS — WIRE ROPE
MANGANESE DIPPER TEETH

EDELEN & BOYER COMPANY

Office and Warehouse Philadelphia
236 North 23rd St. Penna.

Distributors of

Osgood Shovels, Cranes
General Shovels, Cranes
Multi Foote Pavers
Adnun Black Top Pavers
Heltzel Steel Forms, Bins
Heltzel Finishing Mach.
Marsh Capron Mixers
Wonder Concrete Mixers
Marlow Centrifugal Pumps
Marlow Diaphragm Pumps
Chrysler Portable Air Compressors
New Haven Burlapped-Cotton Blankets
Hayward Clamshell Buckets
Huber Rollers
Archer Towers, Buckets
LaCrosse Tu-way Trailers
Burch Stone Spreaders
Sasgen Derricks, etc.
Fiery Hoists
R-B Power Subgrader
Miles Block Machines
Pulsometer Steam Pumps
Bay City Truck Cranes
Tru-Lay Steel Cable
Reynolds Constr. Furnaces
Jackson Wheelbarrows, etc.

GILES & RANSOME

17th St. & Sedgley Ave., Philadelphia

ATHEY TRUSS WHEEL CO.—Crawler Wagons
R. G. LeTOURNEAU, INC.—Carryalls, Buggies
RANSOME CONCRETE MACHINERY CO.—Concrete Mixers and Appliances
BLAW-KNOX CO.—Clam-sheil Buckets, Steel Forms, Steel Buildings, Steel Bins.
CATERPILLAR TRACTOR CO.—Tractors and Road Machinery
RICHMOND SCREW ANCHOR CO.—Concrete Specialties
THE BARNES MFG. CO.—Centrifugal Diaphragm and Force Pumps
NORTHWEST ENGINEERING CO.—Gasoline Cranes and Shovels
ORD—Road Finishing Machine
CLYDE—Hoisting Engines and Derricks

Member: Associated Equipment Distributors

HOWARD W. READ CORP.

800 N. Delaware Ave., Philadelphia, Pa.

Distributors

Koehring Co.
Ingersoll-Rand Co.
Pomona Pump Co.
Gorman-Rupp Co.
Iowa Mfg. Co.
Wm. Bros Boiler & Mfg. Co.
Gallon Iron Works & Mfg. Co.
Metal Forms Co.
Quick-Way Truck Shovel Mfg. Co.

Also Carry in Stock:

Hoisting Engines, Gas and Steam
Pile Driving Hammers
Truck Cranes

SERVICE SUPPLY CORPOR ATION

20th and Venango Sts., Philadelphia, Pa.

Representing

Bay City Shovels, Inc.—Shovels, Cranes, etc.
Blaw-Knox Co.—Clamshell Buckets
Chain Belt Co.—Mixers, Truck Mixers, Pumpcrete, Pumps, Saw Rigs
Chicago Pneumatic Tool Co.—Compressors, Air Tools
Drave Doyle Co.—Tubular Hoisting Towers
Hercules Company—Road Rollers
Insley Mfg. Corp.—Concr. Handling Machy., Excavators
Internat'l Harvester Co.—Indus. Wheeltype and Crawler Tractors
C. S. Johnson & Co.—Bins, Batchers, Cement Handl. Eq.
Littleford Bros.—Road Oil Distrs., Heating Kettles, etc.
McKiernan-Terry Corp.—Pile Hammers, Hoists
Nelson Iron Works—Loaders and Belt Conveyors
The Parsons Company—Trench Machines, Snow Plows
W. A. Riddell Company—Power Graders

Member: Associated Equipment Distributors

J. JACOB SHANNON & COMPANY

1744—Market Street—1744
PHILADELPHIA

Representing

T. L. Smith Co.—Concr. Truck Mixers, Pavers, Glass Mixers
Allis-Chalmers Mfg. Co.—Tractors, Graders
Ralph B. Carter Co.—"Humdinger" Pumps
Baker Mfg. Co.—Bulldozers, Blade & V Snow Plows
John A. Roebling's Sons Co.—Wire Rope, Fittings
E. I. du Pont de Nemours & Co.—Paints, Varnishes
Concrete Surfacing Machy. Co.—"Berg" Concr. Surfacers
Red Star Products Co.—Adjustable Shores, Column Clamps
Sasgen Derrick Co.—Derricks and Winches
Schramm, Inc.—Air Compressors, Pneumatic Tools
Mundy Hoisting Engine Co.—Gas, Elec., Steam Hoists
Shannon—Derricks and Derrick Fittings

ALLEGHENY EQUIPMENT CORPORATION

P. O. Box 1888 Pittsburgh, Pa.

Distributors for

ALLIS-CHALMERS Tractors and Allied Tractor Equipment
GARDNER-DENVER Compressors and Drills
HERCULES Road Rollers
HOUGH "Universal" Road Sweepers
JACKSON Concrete Placement Vibrators
LINK-BELT Power Shovels and Cranes
MICHIGAN ⅜-yd. Truck and Crawler Shovels and Cranes

WESTERN MATERIAL CO.

Aberdeen, Sioux Falls, Rapid City, S. D.

Anthony Digging Leaders, tools
Baldersen Snow Plows
Barber-Greene Ditchers, Loaders
Bates Wire Ties
Bucyrus-Erie "Loadmaster"
Butler Bins, Hoppers
Philip Carey Expansion Joints
"Caterpillar" Equipment
Chain Belt Pump, Mixers
Clyde Sales Hoists
D-A Lubricants
Davey Compressors
Day Crushers
Harris "Russell" Road Equip.
Hester Fireline Plows
LaPlant-Choate Tractor Equip.
LeTourneau Dirt-moving Equip.
Littleford Heating Equip.
Manhattan Belting
Pioneer Crushing Plants
Slusser-McLean Scrapers, Fresnos
Stolle Stone Spreaders
Toro Mowers
Walter Motor Trucks
Wausau Snow Plows
Willamette-Hyster Winches, Hysters

Member: Associated Equipment Distributors

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Sasgen Derrick Co.
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DROTT Bulldozers, Scrapers, Scarifiers, etc.
KINNEY Road Oilers
NAUCK Kettles, Heaters
LaCROSSE Trailers
KOB Sand Spreaders
TORO Highway Mowers
HERCULES Road Rollers
CLEVELAND Rock-Drills
DAVEY Air Compressors
RUSSELL Scrapers, Plows
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HUNTER TRACTOR & MACHY. CO.

Phone: Orchard-6580

327 So. 16th St. Milwaukee, Wis.

Representing

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American Steel & Wire Co.
Archer Iron Works
Atlas Conveyor Co.
Bates Wire Ties
Blaw-Knox Co.
Bucyrus-Erie Co.
Buffalo-Springfield Co.
Burch Corp.
Chain Belt Co.
Clyde Iron Works
Euclid Road Machy. Co.
Iowa Mfg. Co.
Kilnfer Mfg. Corp., Ltd.
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McKiernan-Terry Corp.
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CONTRACTORS AND ENGINEERS MONTHLY

470 Fourth Ave. New York

Contractors and Engineers Monthly

Harry L. Barry, a Partner in the Rogers Company, Wore a Broad Grin As He Bossed Two Major Contracts on Ind. 46.

C. & E. M. Photos

The Dumptors Carried Their 5-Yard Loads of Earth and Rock Down a 24 Per Cent Grade for 14 Hours a Day on the Ralph Rogers Contract. Bulldozers Spread the Earth in 9-Inch Layers and a 10-Ton Roller Compacted It.

C. & E. M. Photo

Ralph Rogers Co. Used a Fleet of Six Dumptors in Making This Fill. See Page 5.

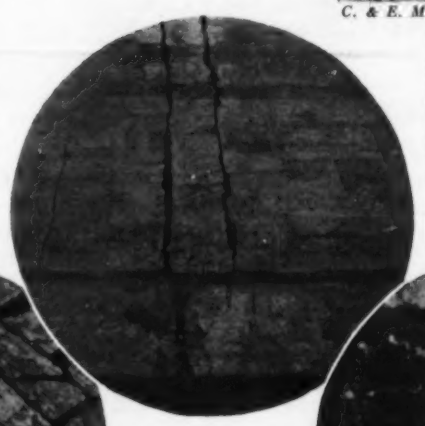
C. & E. M. Photo

Left, the Home-Made Easily-Turned Gravel Planer of Strong and Grant Used to Prepare Subgrade for Concrete Paving on U.S. 91 near Provo, Utah. See Page 8.

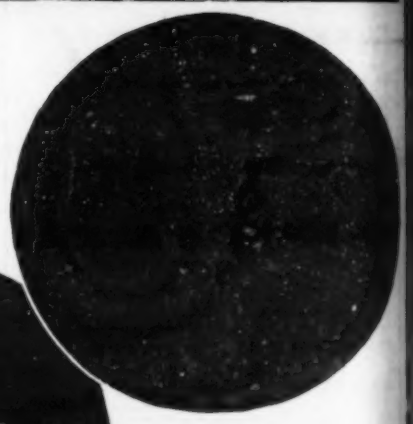
C. & E. M. Photo

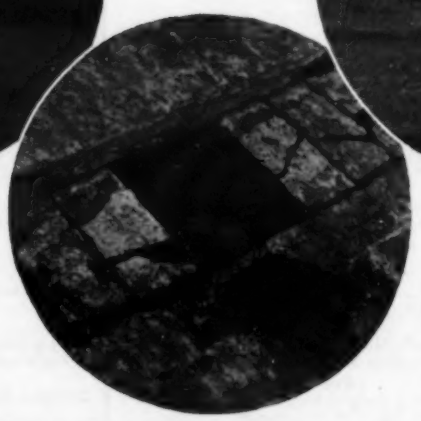
Right, Central Engg. Co. Mounted Its Pumpcrete Unit on the Cofferdam to Handle the Concreting for Dam 16 on the Mississippi at Muscatine, Iowa. See Page 1.

Below, Poor Alignment of an Exuding Type of Expansion Joint in Both the Surface and Base Courses Was the Cause of This Type of Failure.



Below, a Continuous Tar Paper Center Joint to Separate the Two Halves of the Test Brick Road Controlled the Longitudinal Crack.





Results of Carroll County, Ohio, Brick Road Tests by the State Highway Department. See Page 28. Above, Settlement of the Brick over a Slag Cushion, an Indication of Loss of Cushion Through Cracks in the Concrete Base.

Above, Joint Spacing of 100 Feet Was Too Great as All Semi-Monolithic and Grout-Filled Sections Cracked About Half-Way Between Joints.

Above, All of the Bituminous Filler Sections Which Were Left Covered with a Thin Coat of the Excess Filler Impregnated with Grit Were Still from 50 to 100 Per Cent Covered After Two Full Years of Traffic.

Left, "Road Closed" South of Chapulhuacan, Mexico,—for the Very Good Reason That the Road Disappeared in a Rock Slide. A Power Shovel Is Working on One Side of the Slide and Men with Wheelbarrows on the Other. Right, a Concrete Bridge on the Inter-American Highway in Mexico Just After the Falsework Was Removed. See Page 2.

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